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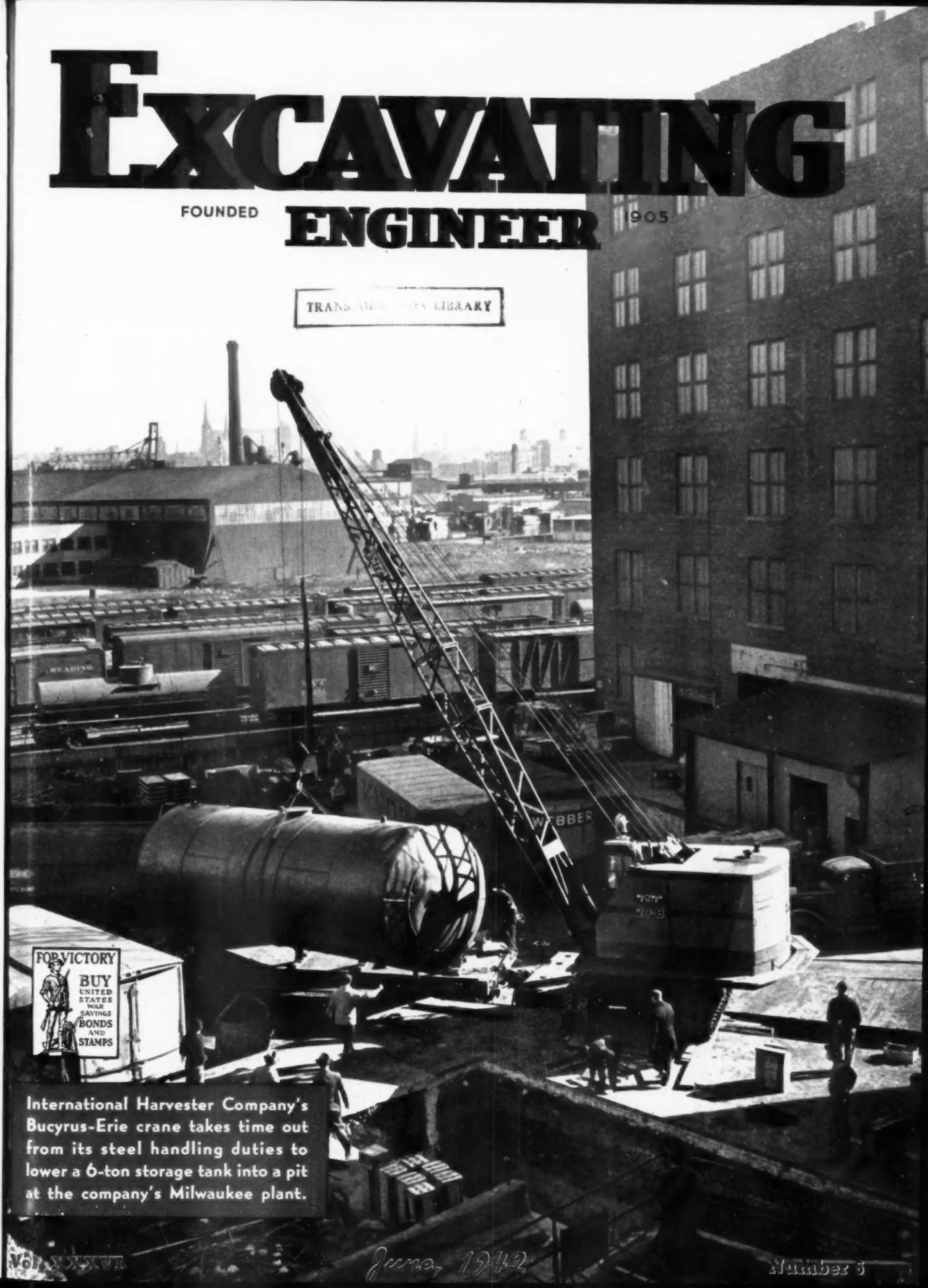
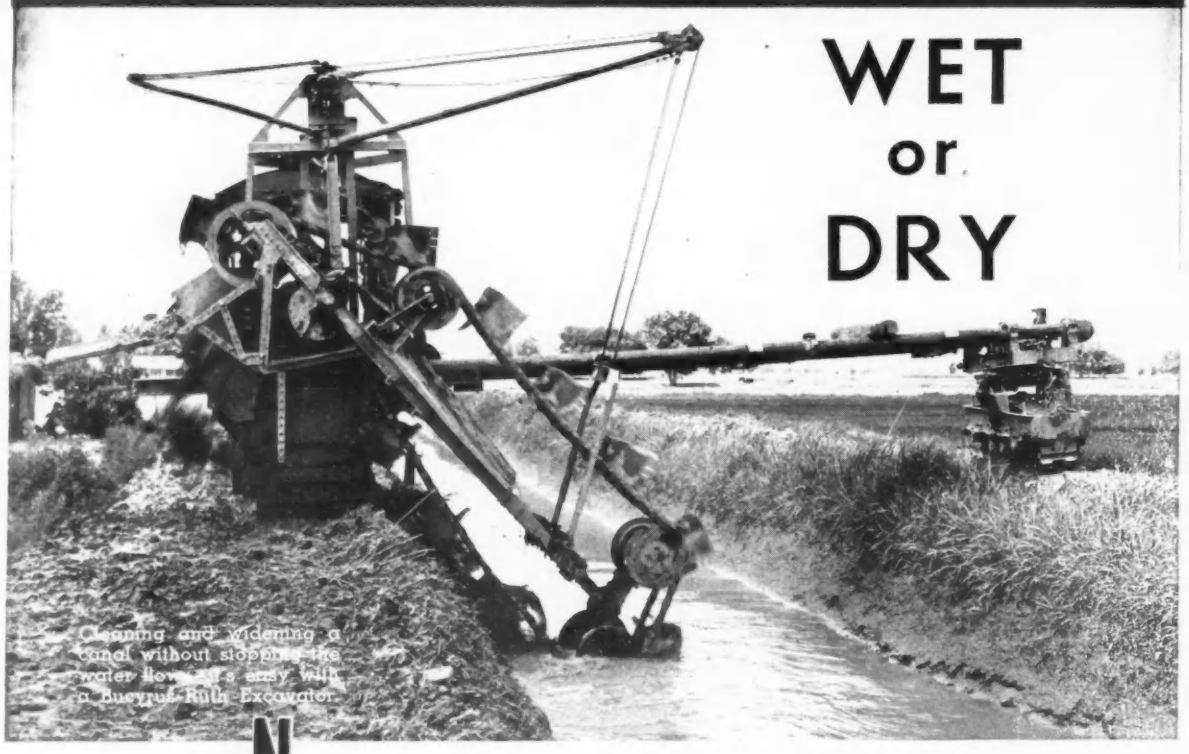


International Harvester Company's Bucyrus-Erie crane takes time out from its steel handling duties to lower a 6-ton storage tank into a pit at the company's Milwaukee plant.

Vol. XXXVI June, 1942 Number 6

CLEAN YOUR DITCHES

WET or DRY



Cleaning and widening a canal without stopping the water flow—all a day's work with a Bucyrus-Ruth Excavator.

No longer need your district interrupt water service to clean ditches. With the Bucyrus-Ruth Excavator you clean wet ditches just the same as dry ones. With water in the ditch, the Bucyrus-Ruth moves along the bank just the same . . . leaves the same smooth, uniform slopes and bottom. It is not necessary for the operator to see the bottom of the ditch to do a good job. Silt, sand, clay, gumbo, loam, gravel, rank growths and even willows can be handled with the excavator. Big, wide tracks keep you on top of soft ditch banks . . . you move as you dig, thus the machine has little chance to settle.

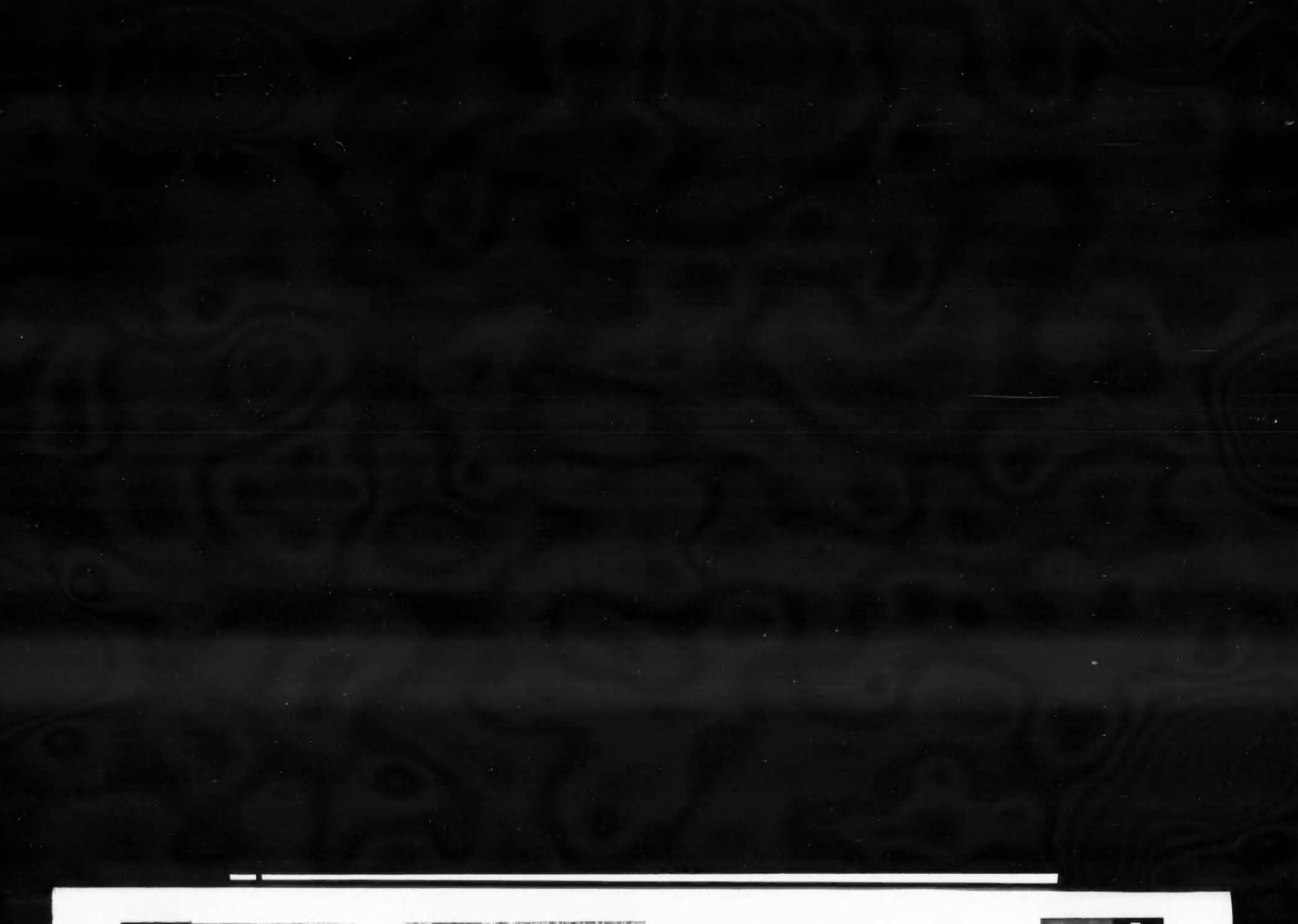
Clean your ditches when they need it . . . without shutting off precious irrigating water . . . with a Bucyrus-Ruth Excavator.

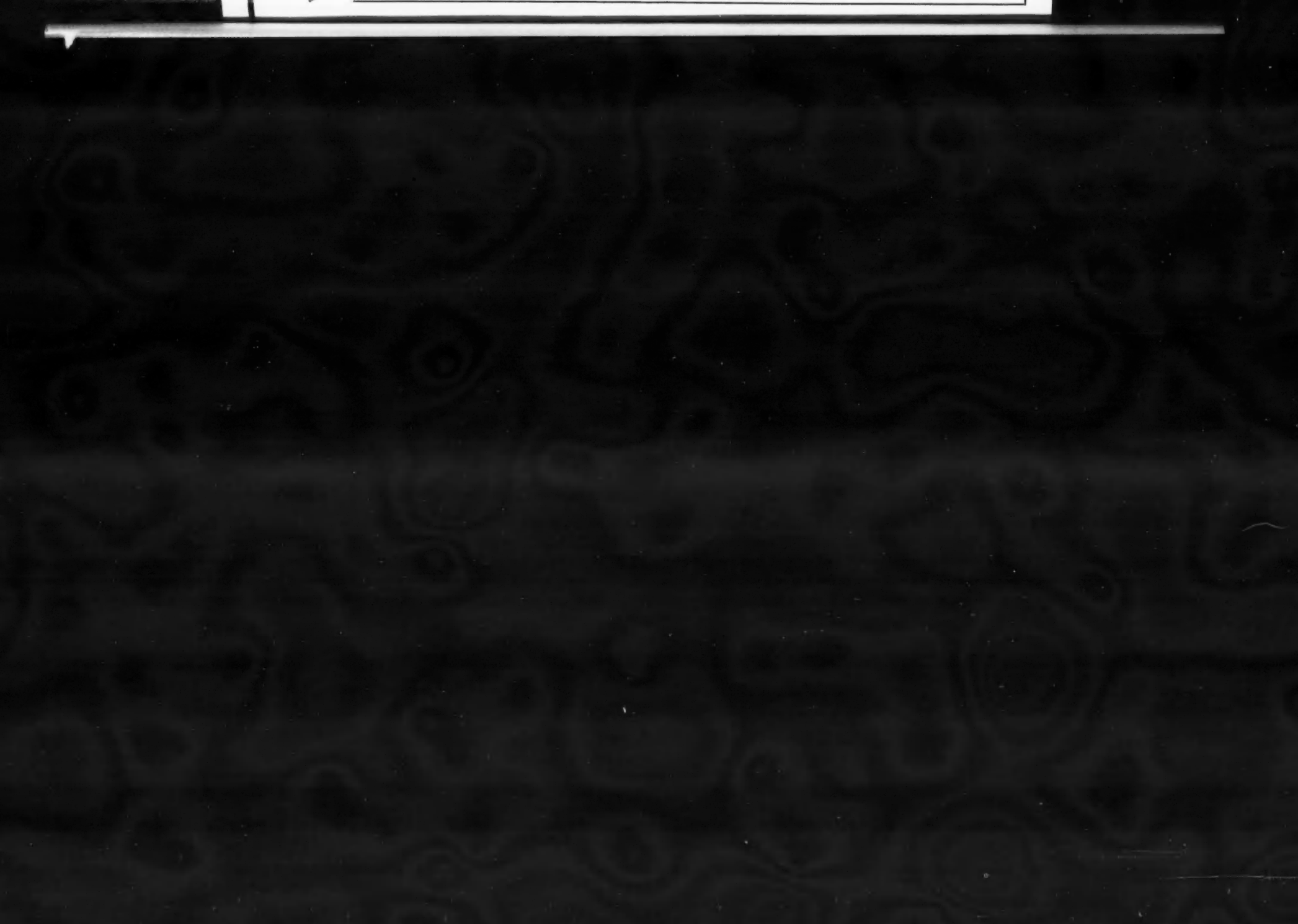
Many irrigation, drainage and reclamation districts . . . the world over . . . use Bucyrus-Erie draglines and tractor equipment for construction and maintenance work. Ask for details.

BUCYRUS ERIE

Bucyrus-Erie

SOUTH MILWAUKEE, WISCONSIN





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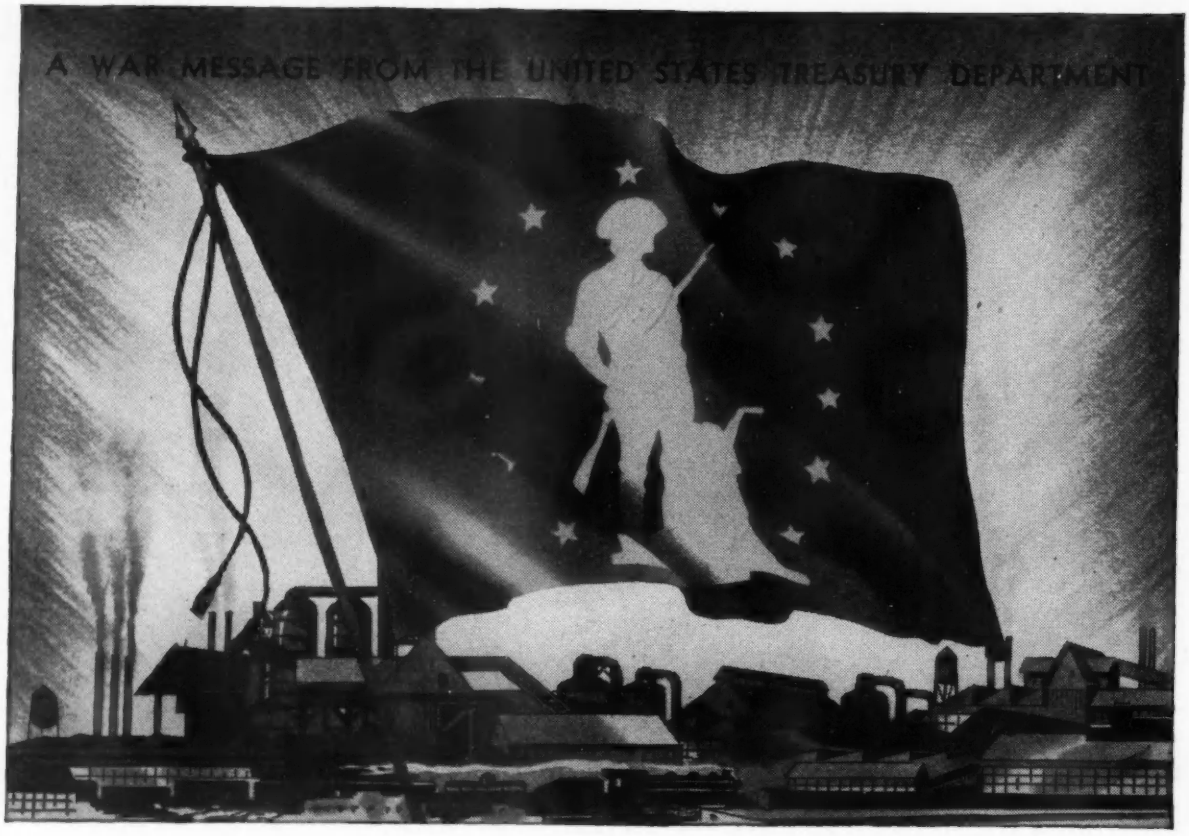


Next to the Stars and Stripes . . .

AS PROUD A FLAG AS INDUSTRY CAN FLY

Signifying 90 Percent or More Employee Participation in the Pay-Roll Savings Plan

IT doesn't go into the smoke of battle, but wherever you see this flag you know that it spells Victory for our boys on the fighting fronts. To everyone, it means that the firm which flies it has attained 90 percent or more employee participation in the Pay-Roll Savings Plan . . . that their employees are turning a part of their earnings into tanks and planes and guns *regularly,* every pay day, through the systematic purchase of U. S. War Bonds.

You don't need to be engaged in war production activity to fly this flag. Any patriotic firm can qualify and make a vital contribution to Victory by making the Pay-Roll Savings Plan available to its employees, and by securing 90 percent or more employee participation. Then notify your State Defense Savings Staff Administrator that you have reached the goal. He will tell you how you may obtain your flag.

If your firm has already installed the Pay-Roll Savings Plan, now is the time to increase your efforts: (1) To secure wider participation and reach the 90-percent goal; (2) to encourage employees to increase their allotments until 10 percent or more of your gross pay roll is subscribed for Bonds. "Token" allotments will not win this war any more than "token" resistance will keep our enemies from our shores, our homes. If your firm has yet to install the Plan, remember, TIME IS SHORT.

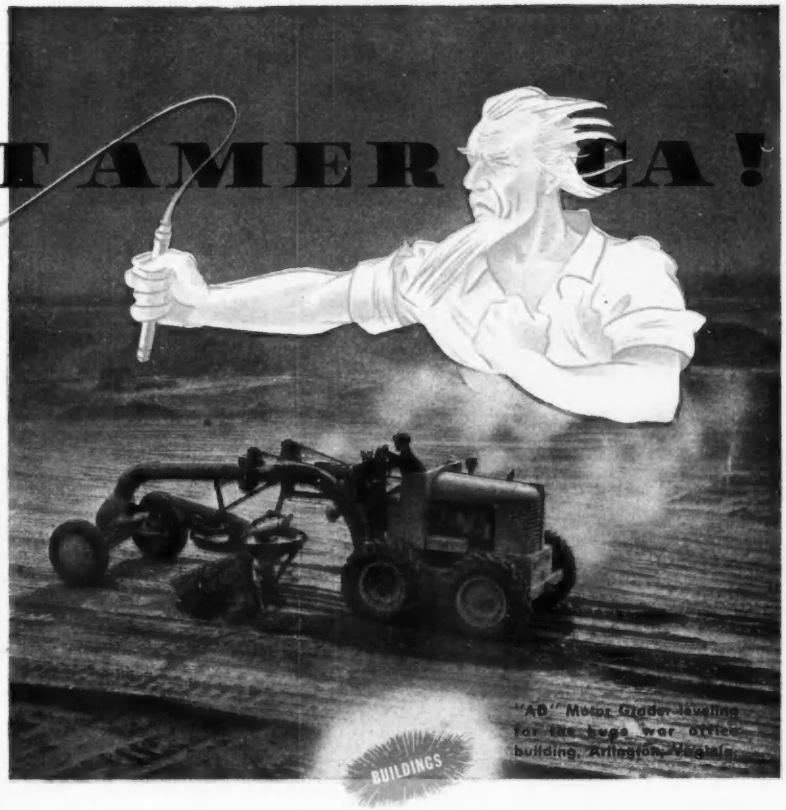
Write or wire for full facts and literature on installing your Pay-Roll Savings Plan now. Address Treasury Department, Section D, 709 12th St., NW., Washington, D. C.

Make Every Pay Day "Bond Day"

U. S. WAR Bonds ★ Stamps

For your convenience in writing to the U. S. Treasury Department, you will find a card bound in this issue.

GO TO IT AMERICA!



"AD" Motor Grader leveling for the huge war office building, Arlington, Virginia.

A big gun is hurriedly moved by a powerful 2-cycle Diesel tractor.

Model M, gas tractor, stringing high tension cable in Washington.

Model HD-7, 2-cycle Diesel tractor 'dozing a road through an army camp in North Carolina.

..and don't spare the whip

Back of America's vast striking power are the countless huge plants that produce the tanks, guns, ships, planes and supplies of all kinds . . . the immense network of power lines that keep them going at full production . . . the thousands of miles of strategic roads that quickly move men and materials. A tremendous task . . . laying the groundwork for these lifelines of freedom! But a job that must be done . . . and is being done . . . fast! More than doing their part . . . on the big, important, time-limit projects . . . are Allis-Chalmers machines of all types. Wherever things are moving fast and the word is "go to it . . . get it done" . . . you'll find them—find them breaking records . . . find them making dirt-moving history . . . and doing it without babying or pampering.

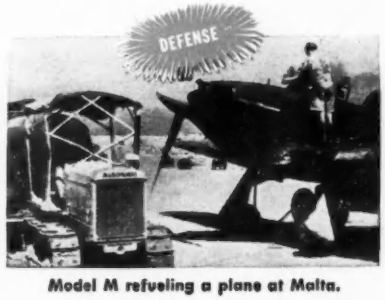
ALLIS-CHALMERS
TRACTOR DIVISION · MILWAUKEE · U. S. A.

Power for Victory

INVEST IN THE FUTURE OF AMERICA . . BUY DEFENSE BONDS AND STAMPS

Model M and Hough Shovel used by army engineers on road construction.

Model HD-14 pulling, HD-10 pushing, on 2,000,000 yd. airport job in Alabama.



Model M refueling a plane at Malta.

For your convenience in writing to Allis-Chalmers, you will find a card bound in this issue.

EXCAVATING
ENGINEER
JUNE • 1942

TAMING WHITE

RIVER FLOOD WATERS

Guy F. Atkinson Company places 2,230,000 yards of rock-fill ahead of schedule at Mud Mountain Dam, meeting and solving a variety of excavation problems

FINAL COMPLETION of the $8,000,000 Mud Mountain Dam project, now anticipated in the early Fall of 1942, will mark the close of a job that had as many operation problems as a three ring circus, even including the erection of a "big top" to house the main event.

Practically every type of excavation has been encountered by the Guy F. Atkinson Company in their contract to handle the 2,230,000 cubic yards of rock and earth fill that went into the construction of this 425-foot high dam. Mud Mountain Dam is a United States Engineer Department flood control project, located on the White River, seven miles southeast of Enumclaw, Washington, and is designed to protect the Puyallup Valley and the Tacoma industrial section against floods greater than any recorded in the past. A record flood, in 1933, caused damage estimated at $951,000 and engineers estimate that a flood 50% greater would be capable of causing more damage than the entire capital cost of Mud Mountain Dam. The dam is designed to control a flow of 40,000 cubic feet per second at the dam site, which would be nearly 50% greater than the 1933 flood.

To provide the desired flood protection, a reservoir with a storage capacity of approximately 130,000 acre-feet behind the dam will normally be kept empty in order to receive and temporarily detain floodwater discharge in excess of the capacity of the river channel. Flood waters thus retained will be gradually released upon subsidence of flood conditions until the reservoir is again empty. The river will continue to run in the old channel, except where it is by-passed around the dam by means of tunnels.

The dam site is formed by a narrow box canyon with nearly vertical rock cliffs about 230 feet in height. The canyon is 90 feet wide at the river bed and 150 feet wide at the top of the rock walls. Above bedrock, the canyon banks consist of glacial boulder till sloping steeply back from the top of the rock walls to a width of about 700 feet at the crest of the dam, which is about 400 feet above the river level. Bedrock is mostly of a volcanic type known geologically as andesite agglomerate.

Mud Mountain Dam's rock-fill structure consists of a central watertight core supported by slopes of quarry rocks and boulders of varying size. Because of its great weight, the rock-fill will easily resist the horizontal water pressure against the dam. An impervious core of sand, gravel, and clay will keep the structure watertight.

Normal flow of the flood water will be discharged from the reservoir through two concrete lined tunnels. One, approximately nine feet in diameter, is so designed that it will pass the normal flow of the river, and will usually be kept open. Excessive flood waters will be discharged through the second tunnel, which is 23 feet in diameter.

Diversion Tunnel

The first major feature of work, after several months of intensive work constructing access roads which in themselves were quite an excavation problem, was the driving of the 23-foot tunnel which carried the river around the dam site during the construction period. This 2,090-foot tunnel was begun on October 26, 1939, and completed May 11, 1940; work being carried on at the rate of twenty 7½-hour shifts per week. From 85 to 100 holes, ranging from five to ten feet and averaging about 6½-feet in depth, were drilled for each heading blast. Charges consisted of between 350 and 500 pounds of 40% mine gelatine detonated by electric exploders in ten series delays for each shot.

Tunnel muck was handled by a 75-A Conway mucker with its 36-inch conveyor belt discharging to

• **Excavation for the concrete-lined spillway involved the handling of 1,140,000 yards of earth and hardpan. Here a Bucyrus-Erie 120-B dragline loads out to 30-yard railroad dump cars. (U. S. Army Engineers Photo.)**

• **Opposite Page: General operations view of Mud Mountain Dam during early fill placing operations showing material processing plant, spillway, and shop area. (U. S. Army Engineers Photo.)**

5-yard Koppel mine cars. Two five-car trains pulled by Goodwin 8-Ton electric locomotives hauled out excavated material.

Other major items of equipment used on this part of the job included a drilling jumbo, designed and built on the job, and seven Gardner-Denver 3½-inch Automatic Water Leyners. A "cherry picker" was also designed and built to pass muck cars in the tunnel. It was necessary to timber the entire tunnel with nine-piece sets of 12 x 12-inch timbers on 4-foot centers with 2-inch lagging except in heavy ground where the crown lagging was increased to six or eight inches.

Excavation of the 1800 feet of 9-foot horseshoe type tunnel that will by-pass the normal stream flow, was started in May and completed in October of 1940. Four Gardner-Denver 3½-inch Automatic Water Leyners and a drilling jumbo were used in the heading of this tunnel. An average of 34 holes were drilled to depths ranging from 4 to 8 feet. The average amount of powder used per round was 125 pounds. Most of this tunnel was timbered, using 8 x 8-foot six-piece timber sets on 4-foot centers with 3-inch lagging. Working 20 shifts per week at 7½ hours per shift, an average of 108 cubic yards (including overbreak) or 19.1 feet of progress per day was maintained.

Spillway Excavation

Construction of the concrete-lined spillway involved the excavation of approximately 1,140,000 yards in a cut running to a maximum depth of 100 feet. The completed spillway is 1,100 feet long, 315 feet wide at its crest and 120 feet wide at the bottom.

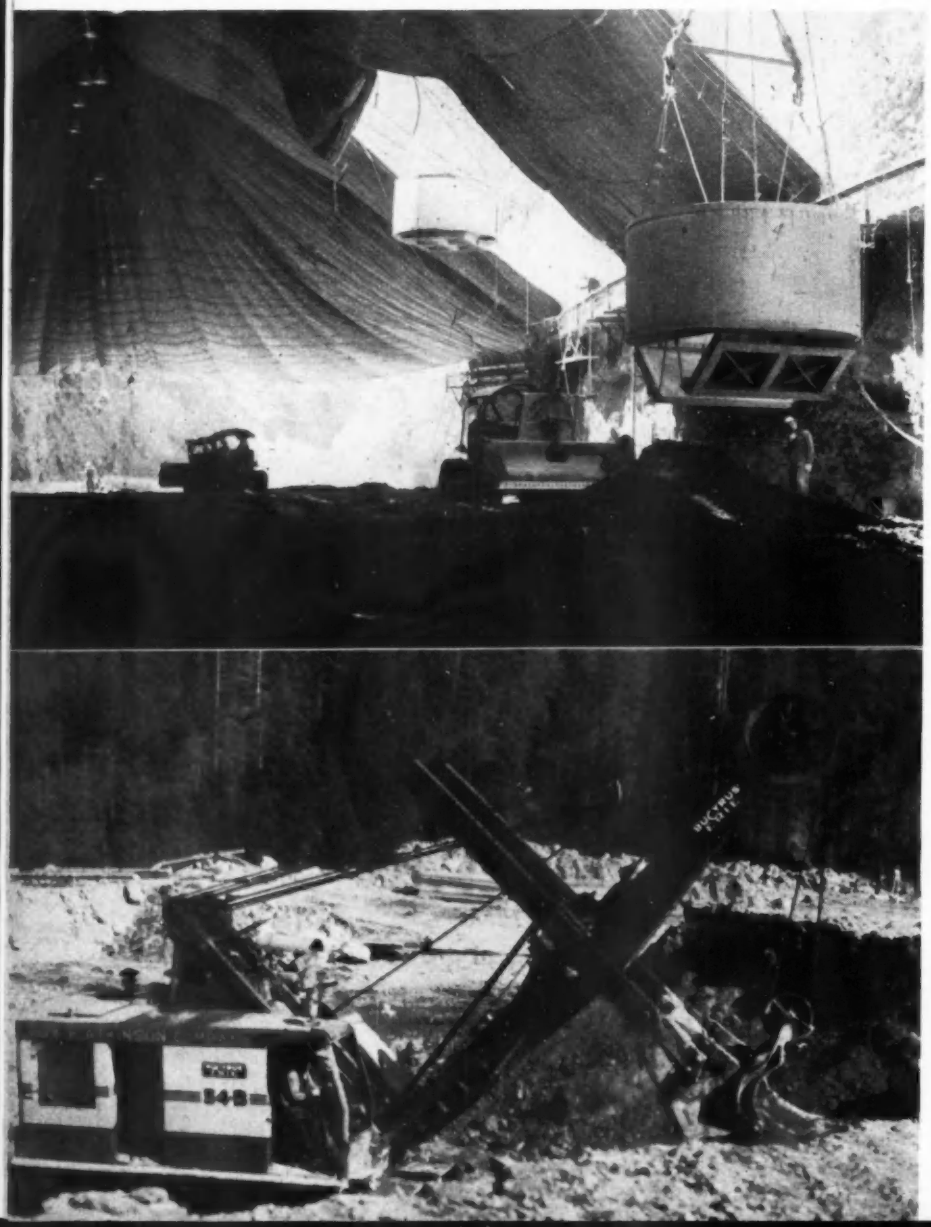
Spillway excavation was started in September, 1939, and completed in July, 1940. Although the material was classified and bid as common excavation, as the work progressed, a hardpan formation was encountered that required drilling and blasting. To move this material, 10-foot deep blast holes were drilled on 10-foot centers by wagon drills and were loaded with 30% gelatin on a ratio of 1¼ pounds to the cubic yard of material to be moved. Blasted material was excavated and loaded out by shovels and draglines. Approximately 440,000 yards were hauled by trucks and 700,000 yards were hauled by rail. Rail haul became necessary when a satisfactory haul road could no longer be maintained in the blue clay strata that had been softened by incessant rains.

During these operations an average of 3,800 yards was excavated and hauled per 22½-hour day. Twenty 7½-hour shifts were worked per week.

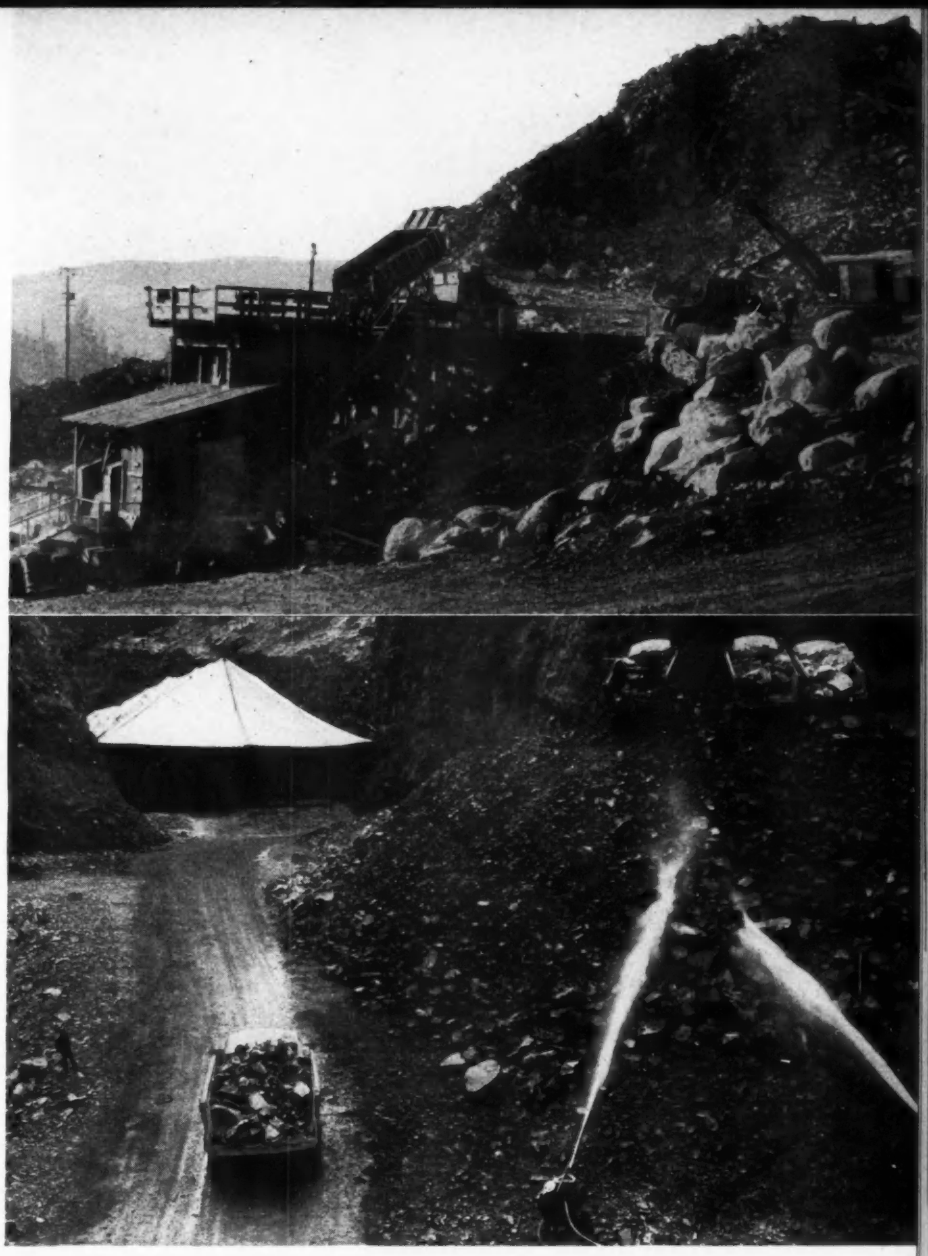
A Bucyrus-Erie 54-B and a Northwest 80-D working with dragline and shovel front ends, excavated most of the material with the 60-day assistance of a Bucyrus-Erie 120-B dragline. Four Caterpillar RD-8 tractors equipped with LeTourneau bulldozers were also used.

Six 20-yard Sterling diesel trucks and 18 miscellaneous subcontractor's trucks ranging from 4-yard Fords to 10-yard Internationals hauled off the dirt. These trucks operated on a maximum grade of 10% with an average haul length of 2,000 feet.

Railroad haulage equipment included four Shay geared steam locomotives ranging from 55 to 80 tons pulling ten 30-yard and two 20-yard air dump cars. Stand-



• **Top: Processed core material was swung from the plant on the canyon edge above in 9-yard bottom dump buckets through "hatchways" in the protective tent cover. Bottom: A Bucyrus-Erie 2½-yard shovel at work in the spillway excavation area.**



• Top: A 1½-yard Lorain shovel loads Western dump trucks at quarry No. 2 for a "short haul" to the primary crusher hopper at the left. Bottom: Dumped rock fill in dam zones 1 and 3 was carefully sluiced to provide a rock-on-rock bearing and so reduce eventual settlement.

ard gauge No. 60 rail and accessories were used. Maximum grade in the pit was 6% and on the mainline 2½%. Rail hauls averaged 4,000 feet with final dumping done off a standard 4 pile bent trestle. Average trains consisted of one engine and three 30-yard cars, a helper engine being necessary on maximum grades.

Cleaning Up Riverbed

Excavation of original riverbed material and that deposited from canyon wall scaling operations required the removal of approximately 264,000 yards of sand, gravel and boulders. All material was loaded by two Northwests, 2½-yard diesel and 2-yard gas shovels. During final bedrock clean-up, a clamshell was also put into service. Hauling equipment consisted of ten 8-yard International dump trucks and five 12-yard Western diesel dump trucks. Boulders too large for shovel loading were drilled and shot.

Sluicing the bedrock with high pressure nozzles was effective in removing all traces of clay and sand. In several areas, large pot holes and caves were found in the bedrock and canyon walls which required considerable hand excavation. Because of the steep natural gradient of bedrock and well constructed cofferdams no serious pumping problems developed. These riverbed excavation operations were begun on October 29, 1940, and completed March 5, 1941. Work was carried on three shifts per day, six days per week.

Core Fill Borrow Pit

Before actual excavation operations for the core fill material from the borrow pit could be started, it was necessary to clear about 30 acres of timbered land. After completion of this preliminary work, approximately 345,000 yards of top soil containing loose sand and scattered boulders were stripped from the area exposing a horizontal plane of glacial till. This till varied in depth from 3 to 20 feet and lay over a bed of sand and gravel averaging 30 feet in thickness. Although either of the latter deposits alone would be unsuitable for the pervious core of the dam, a combination of the two in proper proportion, having a certain moisture content when compacted, provided excellent impervious material. Control of the percentage of till was accomplished by regulating depth of shovel cut through layers of till and other materials, and by stock piling it in layers on the sand and gravel bed. The proportions were then easily controlled by the depth of cut made by the shovel through both materials.

An unusual feature of the Mud Mountain Dam job was the huge tent suspended over the fill area during early fill operations. The erection of this "big top" enabled the Guy F. Atkinson Company to maintain a steady 24-hour schedule during fill placing operations regardless of rain or snow. Fabricated by the Seattle Tent & Awning Company, this large canvas, weighing approximately 35,000 pounds, was laid in sections on the canyon floor, where it was laced and lifted manually in a single piece by a crew of more than 30

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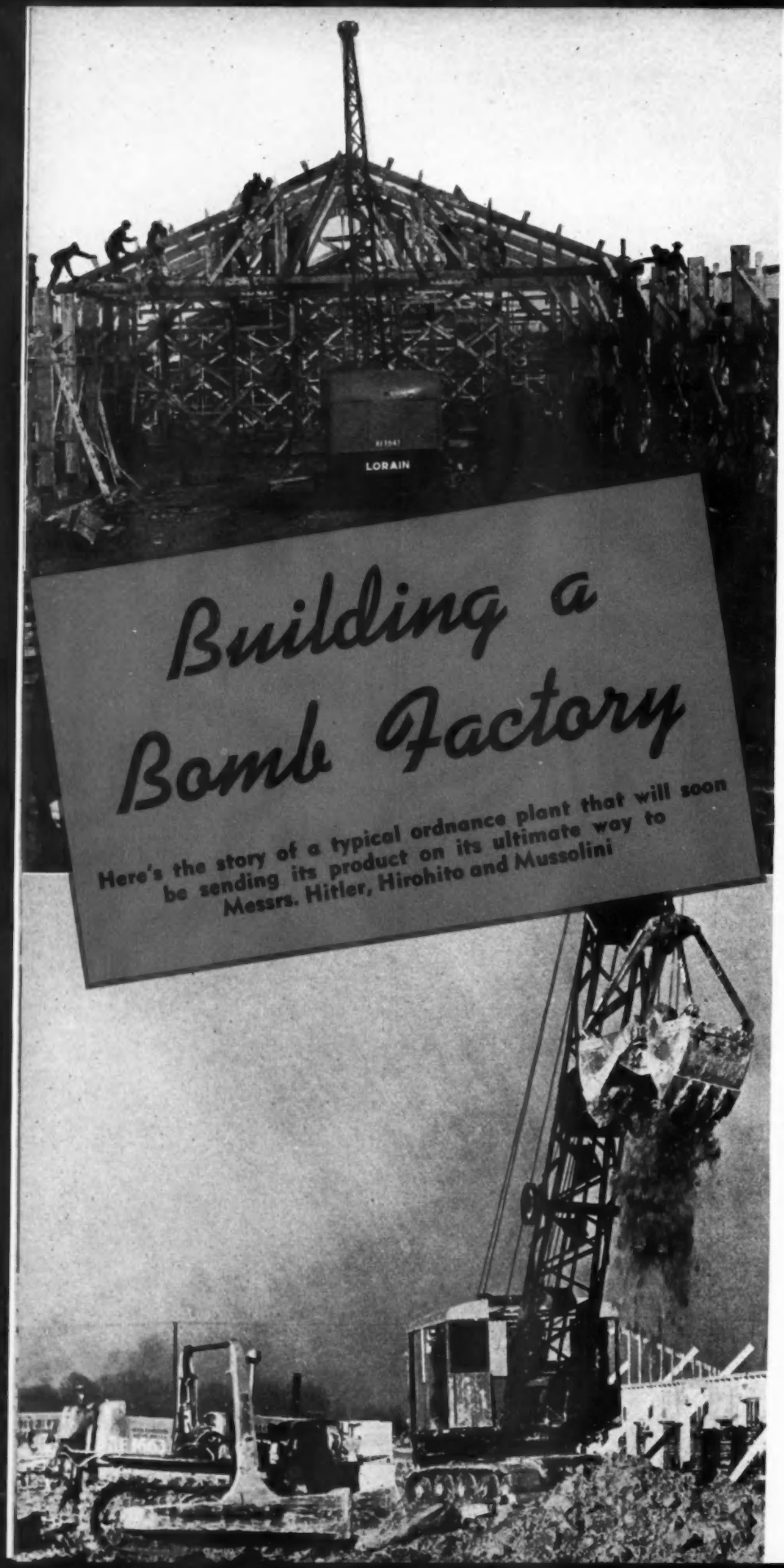


Building a Bomb Factory

Here's the story of a typical ordnance plant that will soon be sending its product on its ultimate way to Messrs. Hitler, Hirohito and Mussolini

THE MEN BEHIND the man behind the gun are going "all out" in their plans to provide that gun with plenty of ammunition in the shortest possible time. U. S. Army ordnance plants, the all important sources of this ammunition, are mushrooming into existence in a scattered chain from coast to coast at a pace that is topping the fondest expectations of army engineers. Modern excavating equipment has played and is playing a major role in making this construction speed possible by performing on the double quick the basic digging and lifting tasks assigned by Uncle Sam.

A typical "fireworks factory" is now nearing completion in the mid-western section of the country. Although much of the information on an important war project of this type must be censored, the following will give some idea of the operations problems involved in ordnance plant construction.

Early in August, 1941, citizens of several small towns in a mid-western state eagerly scanned local newspapers announcing the definite choice of the ordnance plant site that meant a $25,000,000 project was scheduled right for their own back yards. Construction of the plant was started during August, 1941, under the direction of the Construction Division of the U. S. Quartermaster Corps. Later administration of the project was transferred to the U. S. Army Engineers.

Contract Awarded

Under the direct supervision of a U. S. Army officer, "cost-plus-a-fixed-fee" contracts for the construction of the 35,000-acre ordnance plant were undertaken by the combined forces of a Chicago company and a New York company who were the constructing contractors on the project. The shell and bomb loading plant will

• **Top: Wooden trusses are swung into place on an ordnance plant building by a Lorain rigged as a crane. Bottom: A clamshell receives the cleanup assistance of a Baker bulldozer mounted on an Allis-Chalmers during building excavation operations.**

• Top: Two excavating machines, a Bucyrus-Erie and a Lorain, pitch in to do crane duty as the heavier equipment is unloaded. Center: Caterpillar - powered LeTourneau scrapers and bulldozers grade a railroad site with the assistance of the Bucyrus-Erie dragline in the background. Bottom: Material excavated on a new plant road is loaded out to Linn tractors by a Marion shovel.

be operated for the government by an industrial corporation.

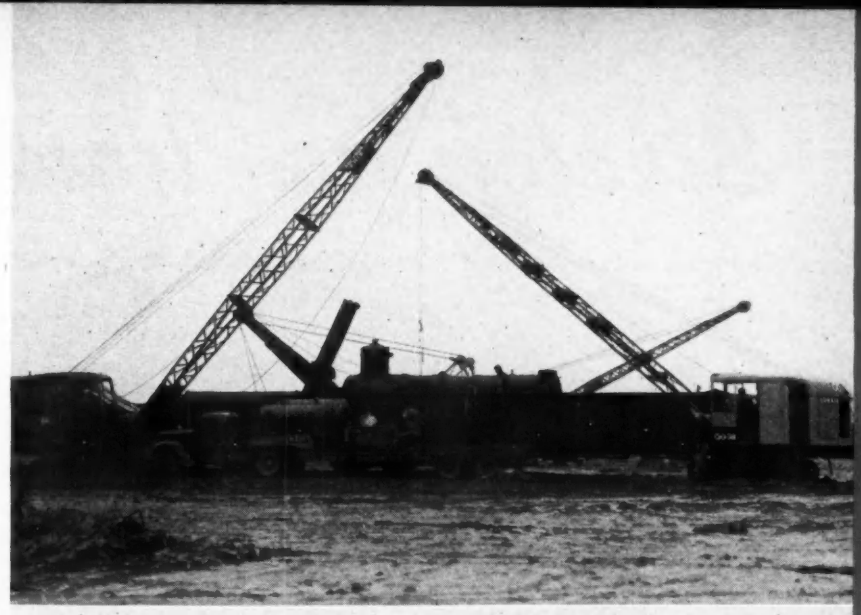
Moving in over $1,000,000 worth of equipment (see accompanying list), Uncle Sam and the contractors tackled the job of "tailoring" the sand and clay in the rolling terrain to suit the needs of a first class ordnance plant in the shortest possible time. Major excavation tasks before the assorted shovels, dragshovels, scrapers, tractors, and trenchers on the job included construction of railroads, roads, bridges, drainage, grading and footing excavation for several hundred buildings.

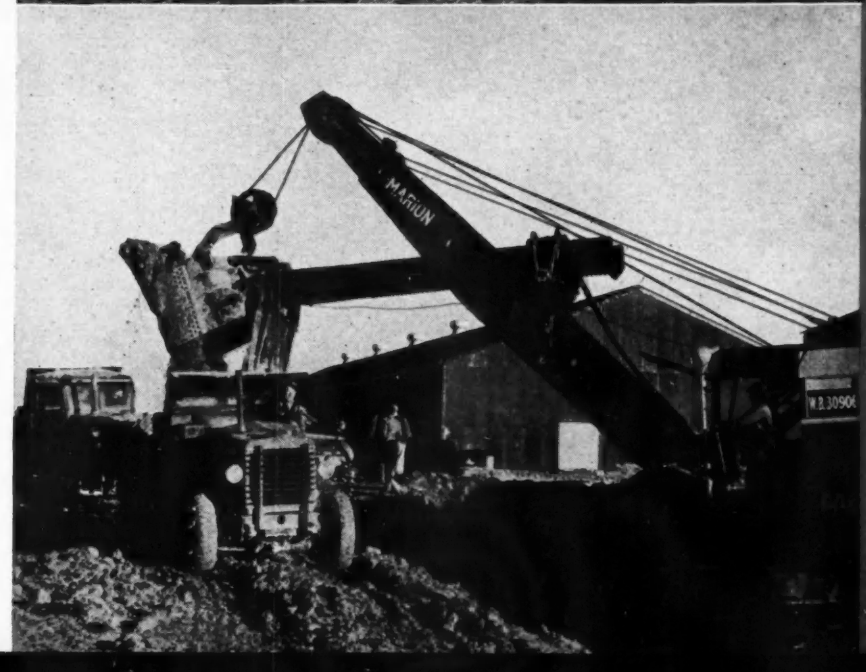
Moving in this equipment, as well as large amounts of gravel, lumber, steel, etc., proved to be a man-sized job in itself. Fast handling was the answer and over 2600 carloads of materials were unloaded at the rate of 176 carloads every 24 hours.

Since the plant area is comparatively level, there are no unusually large cuts or fills. The contractors will move approximately 600,000 yards of dirt in the excavation for 75 miles of railroad bed, 25 miles of primary roads, and 50 miles of secondary roads. Railroad beds are being surfaced with a gravel coat for erosion protection. Gravel, topped by a finishing coat of calcium chloride, also provides the surfacing for new roads in the plant area. Primary roads are to receive a permanent black top coating.

General grading with tractor-drawn scrapers, drainage ditch excavation with draglines and trenchers, and footing trench digging with dragshovels for the several hundred plant buildings kept all major dirt moving equipment busy on a 24-hour schedule during early operations. Later, after the biggest part of the dirt moving job was out of the way, only a 9-hour day was necessary.

(Continued on page 324)





Stretching Your Gasoline

Common sense use and maintenance of gasoline-powered equipment may decrease your fuel bill as much as 25%

By J. E. VAN SANT

ANY TIME is a good time to save gas. Right now, with the nation marshalling its resources for victory, it is not only economical but patriotic to get the most out of your gasoline fuel.

It is no exaggeration to say that three-fourths of the cars, trucks, stationary engines, compressors, pumps, and conveyors in operation are burning 25% more fuel than they should. Save that one wasted gallon out of every four, multiply it on a nationwide scale, and it means the conservation of millions of gallons of gasoline as well as a huge saving to operators.

How can this be done? Well, the secret of gasoline economy lies in three chief factors—the mechanical condition of the equipment, the type of fuel used, and the operator. Of these, the first is most important.

Mechanically, the carburetor is probably the most common gas thief, but almost anything can affect gasoline consumption, and it is usually a combination of causes that is guilty. Fouled plugs, dragging brakes, faulty ignition, poor compression, under-inflated tires; these are only some of the causes of fuel waste, any combination, or any one of which may take its toll from each gallon of gasoline.

The mechanical secret of gasoline economy is the perfect functioning of all the working parts of the equipment, performance which calls for frequent and thorough maintenance. This has never before been as important as it is today with closer clearances and higher engine speeds and temperatures. Finer mechanical precision has made the modern motor highly sensitive to adjustments, so that greater skill and knowledge is demanded of mechanics, and the use of scientifically designed shop equipment is almost an essential.

•Left: Gasoline furnishes the motive power for this Kochring W60 Dumptor taking aboard a load of dirt during excavation of the Skyline Drive at Loco Gap, North Carolina.

That does not mean that there is nothing for the mechanically-minded operator to do. To a large extent the good performance of any motor still depends on the driver's careful attention to adjustments which he can make himself, and to his wise use of service facilities.

nderformance

In order to get rid of a thief you must first catch him stealing, and the best general practice here is by regular and frequent tune-ups. A modern maintenance shop, equipped with instruments which quickly and accurately analyze motor troubles, will pay dividends. Regular tune-up procedure means added miles or hours of service and prevention of future grief.

Besides the regular adjustments, the chief value of a tune-up is keeping tab on motor performance. A fuel ratio analysis may, for example, show that your carburetor is too rich or too lean. Perhaps a jet is worn or clogged by dirt, lead, or residues from the fuel, but in any case you know that the carburetor needs to be overhauled. It is good practice to clean it every 10,000 miles, or the equivalent, depending on the type of gasoline used and the condition of the air cleaner. Worn parts should always be replaced.

• Above: Bay City, Michigan, puts a gasoline-powered Haiss loader and a General Motors truck to work on a road cleanup job.

• Fuel economy is important on a job that employs gasoline-powered shovels as well as trucks. Here double-spotted Bucyrus-Erie ½-yard shovels owned by E. E. Hood of San Antonio, Texas, load out to four light trucks.

You can experiment with different sized main jets to arrive at the smallest that will give efficient performance. In all probability you can use a smaller main jet than the standard equipment with entire satisfaction and considerable economy. They are inexpensive and easy to install. Too lean a mixture, however, is poor economy, for it not only results in less power and snap, but the automatic step-up valve opens oftener because of the lesser vacuum set up in the manifold, with consequent extra rich mixture.

Sometimes it is not the carburetor that is responsible for improper mixture. A clogged air cleaner may restrict the passage of air into the carburetor, or a leak around the intake manifold may change the proportions of the mixture.

The timing of a motor does not often get out of adjustment, but if it does it can be a serious handicap to power and economy. While it can be adjusted without instruments, it is practically impossible to do it accurately. As absolute accuracy is essential for this vital adjustment, a neon timing light should be used.

If compression is low, consumption will be high. Sticking valves, poor valve seats, worn rings, or tappet adjustment are the most likely causes. Correcting such faults is expensive, so it is wise to make sure by a test that you really have them.

The fact that a motor uses oil may mean that it is getting by the rings with accompanying blow-by and power compression, but not necessarily so. A leaky gasket or a loose main bearing may be responsible, and on double diaphram fuel pumps, a bad dia-

phram may suck oil from the crankcase into the firing chamber. This latter defect may also cause serious waste of fuel by injecting excessive amounts into the carburetor.

Spark Plugs Important

Spark plugs can rob you of as much as a tenth of your gasoline. With use they become inefficient, developing a weak spark and pressure shorts. The advice to change them every 10,000 miles is based on more than sales talk. The high school boy's practical joke of shorting the plugs of his friend's jalopy by making a pencil mark down the porcelains may not show the proper sense of humor, but it does illustrate how easily the same thing can be done by grease or carbon. Keep your plugs clean. Remember that the hot spark of today burns away electrodes rapidly, making frequent adjustments advisable.

To many people a plug is a plug, but if you want good results, use only the type specified for your motor by the manufacturer. The wrong type of plug, or old, inefficient plugs can be blamed for much of the hard starting trouble, cause missing, and affect the whole performance of your motor. A new set of plugs will frequently add four miles a gallon to a truck or car and a comparable saving to stationary motors.

The setting of the distributor, or "spark," is of great importance. If it is set too slow, sluggish performance results, which means that power and gasoline are being wasted. If advanced too far, the result is a "ping" or fuel knock, which also means loss of power.

The proper spark setting is as far advanced as possible without ping. Adjust it so that when you accelerate quickly there will be a slight momentary knock. This is caused by the interval required for the automatic spark advance to adjust itself. The setting should vary with the type of fuel used, and for this reason it is best to keep to the same, or similar type of fuel. For example, a gas with a low octane rating will give a fuel knock at a slower spark setting than one with a higher octane rating. The reason for this will be explained later.

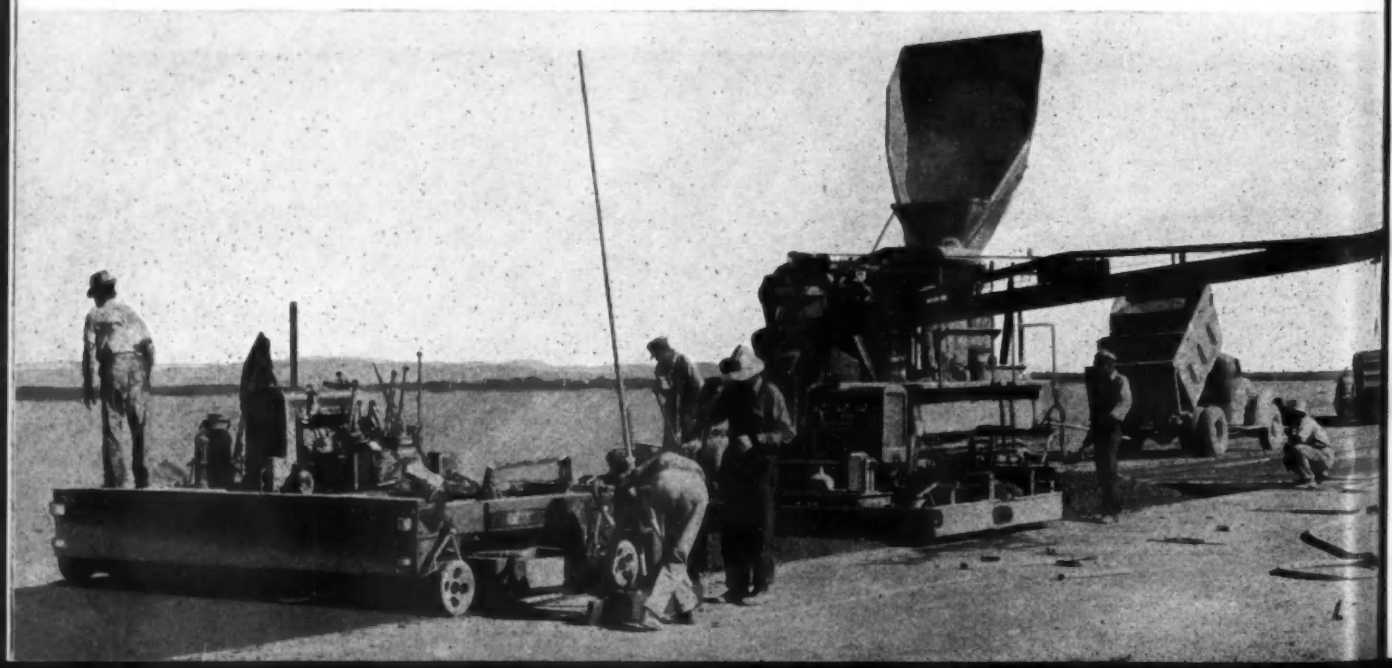
Take advantage of the times when your truck is on a hoist to test the wheels for dragging brakes. It is only necessary to spin each wheel to do this. If a brake is dragging you can hear it. This may be done just as effectively by jacking up each wheel separately and turning it. A dragging brake can pull down mileage seriously, and it is something that you are not likely to notice or even suspect unless you look for it.

Wheels out of alignment, or the increased friction of under-inflated tires will decrease both mileage and the life of tires. Check tires regularly, and don't be afraid of air pressure increase from hot weather. Tests have shown that expansion from this cause is very little except under extreme heat conditions.

Likewise, keep your battery fully charged. If your primary circuit is weak, the secondary circuit will be weak also, with consequent inefficient ignition. Leaky cables or greasy or worn wire insulations will have the same effect.

Friction at any point is always a fuel factor, and careful lubrication and bearing adjustments are important. A wheel bearing that is too tight acts as a constant brake, and so does a dry one. The heavier the oil or grease, the more drag on the motor. Contrary to common belief, a light oil is a better lubricant than a heavy one. Use the lightest oil that is consistent with the condition of your motor. Laboratory tests have shown that oil does wear out, certain essential parts being destroyed under motor conditions which can never be replaced. For this reason, as well as to remove abrasive impurities that collect in spite of filters, the periodic oil change is necessary.

Don't neglect to have heavy differential and transmission grease changed seasonally. Grease that



• Concrete mixing and spreading equipment is largely gasoline-powered. This view shows a Rex paver followed by a Jaeger spreader and a Jaeger-Lakewood finisher on an Arizona airport job.

• A gasoline-powered Barber-Greene vertical boom ditcher digs a building foundation trench in jig time at a midwestern shell loading plant.

is suitable for summer will pull like glue in winter.

The most efficient fuel for a gasoline motor is one that will not ignite except by spark or flame, and should not ignite from engine heat. For this reason, in the better grades of gasoline the rate of combustion is slowed down by the addition of cracked gasoline or ethyl fluid. This prevents combustion knocks which are caused by improper ignition.

The combustion knock, or ping, is both harmful to motor parts and wasteful of power. It is not just a noise, but a definite force. The difference between this and correct combustion may be compared to the difference between a sudden blow and a steady push. It is produced as follows: the first portion of fuel in the firing chamber ignites from the spark, while the other part farthest from the plug is ignited not from the advancing flame, but by self-ignition caused by pressure increase from the burned portion's expansion. When pressure waves from these two separately burning portions meet, the result is the detonation which is called the ping. Power is generated too rapidly for the motor to absorb, and the excess is wasted in the form of heat.

Retarding the spark reduces the ping by delaying the ignition, but at the expense of snap.

Regardless of the kind of gas used, or the condition of truck or car, you cannot get good economy with wasteful driving or operating habits.

Don't expect economy at high speeds. A recent test showed that mileage dropped from 20 miles per gallon at 30 mph to 10.5 miles per gallon at 60.

Speeding in second or low gear, too fast idling, or racing a motor is pure waste, and unnecessary choking is simply throwing away gas.

You shoot a charge of raw gas into the motor every time you step on the accelerator, and a nervous foot wastes its weight in gasoline in a short time. Learn the feel of your motor, and practice reasonable acceleration and deceleration.

Remember that the gas burned while the driver stops to talk to a friend or get out to run a short errand is wasted power that can never be recovered.

In general, keep in mind that all parts of a gasoline motor should always be kept in good condition; don't neglect the little daily attentions that uncover trouble before it becomes serious, and increased motor efficiency will more than repay you.

Timely Tips

A container that has held flammable liquids is very apt to explode unless it is thoroughly cleansed before attempting to weld, cut, solder, or otherwise apply heat to it.

It is extremely hazardous to look with the naked eye at the arc when welders are cutting or welding. The invisible rays from flame or arc can painfully injure the eyes and sight.

Carbon monoxide gas, most commonly encountered in the exhaust of automobile engines, is odorless and colorless. A man is completely unaware of its presence until he feels its effect.

Many persons have the mistaken idea that safety shoes are uncomfortable, awkward and cumbersome. The fact is that most safety shoes can't be distinguished from street shoes and are just as comfortable, if fitted properly.

Fiber rope is subject to rapid deterioration in a water-soaked or muddy condition. It should be cleaned promptly with a hose stream to remove the mud and sand, and then hung up to dry thoroughly.

A kink can do more damage in wire rope than months of wear. It will not straighten out under a working strain, and it makes the rope unsafe for use.

All ditches or trenches on construction work should be protected by barricades, signs and lanterns to warn of danger and prevent anyone from falling into the excavation—*"Safe Worker"*

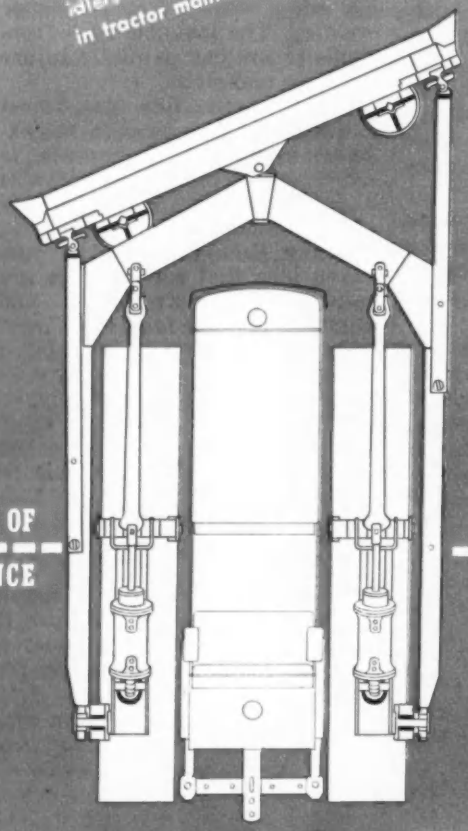
TRACTOR BAL

with BUCYRUS ERIE

BALANCED GRADING:
Bucyrus-Erie balanced units do not nose down, gouge the grade, tip down into low spots, nor tend to follow the dump down over the edge of the fill.

FULL TRACTIVE EFFORT:
Tracks work full length on the ground, no nosing forward when backing up, no traction wasted pulling against air when pushing dirt.

LOW MAINTENANCE ON TRACTOR:
Track roller loads are distributed evenly. Excessive wear and strain on front track idlers and rollers is eliminated; large saving in tractor maintenance results.



WATCH Bucyrus-Erie Bullgraders and Bulldozers work; notice how the full length of the tracks bears on the ground at all times. The drive is smooth, even and easy on the tractor. Even an inexperienced man can quickly learn to operate this equipment so there is no nosing down, grade gouging, jerking or stalling. The blade digs in and sweeps through the cut with smooth, even, fast action that turns out record outputs and accurate grades.

This ease and accuracy of performance is, in no small measure, due to the balanced distribution of the weight of the unit and the digging loads. Mounting Bucyrus-Erie Bullgrader or Bulldozer changes only very slightly the original balance of the tractor. The weight and digging loads are properly distributed to give you the most effective digging and dirt carrying performance.

Because the weight distribution has been given such careful study by Bucyrus-Erie engineers, you get full advantage of all the power furnished by the tractor. This means more power at the blade, more dirt moved and less fuel burned.

Balanced loads and smooth full-length crawler drive also mean big savings in maintenance costs on both blade equipment and tractor. This economy can be particularly noticed in the longer life obtained from front track-idlers and track rollers. Bucyrus-Erie Company, South Milwaukee, Wisconsin, U. S. A.

BUCYRUS ERIE

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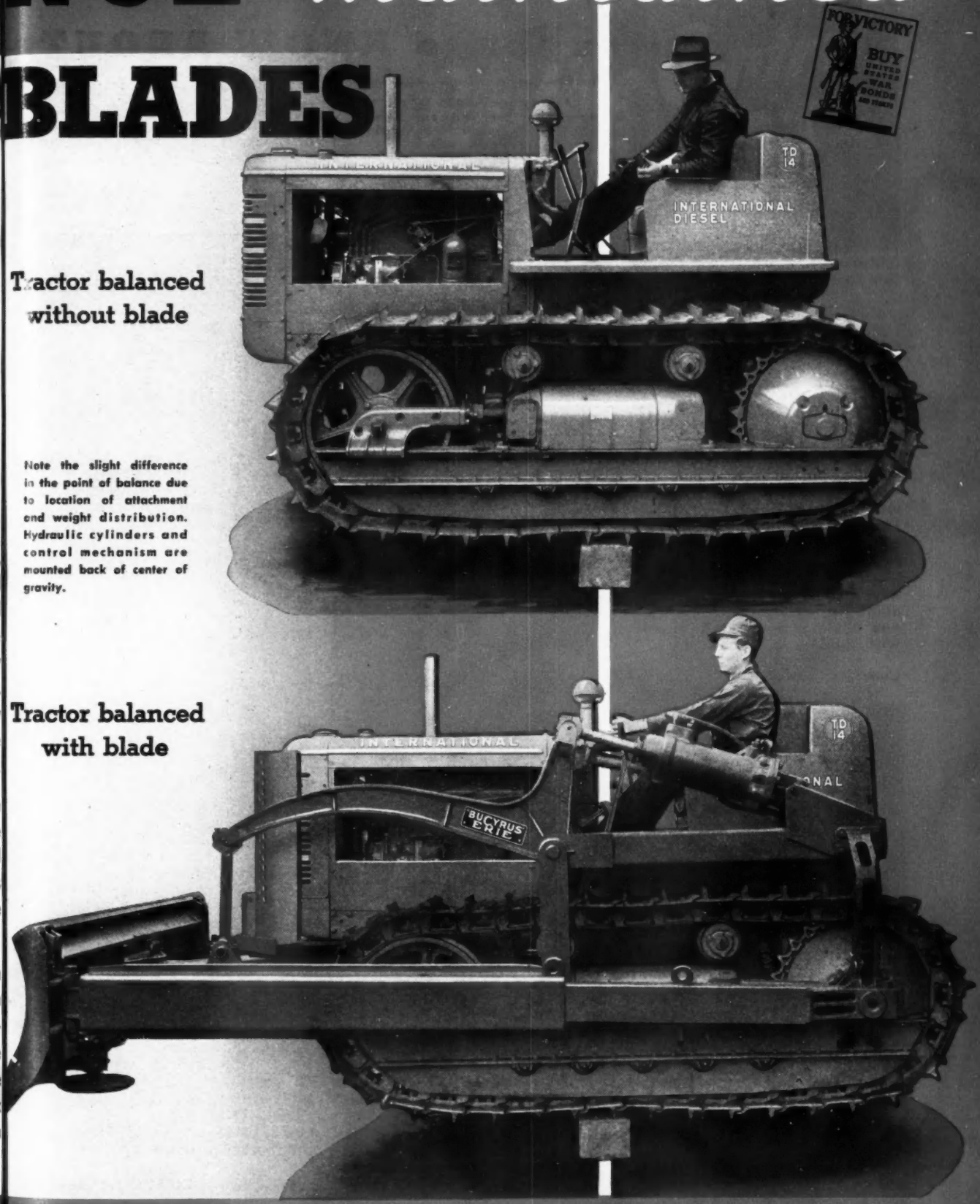
SEE YOUR INTERNATI

LNCE *maintained*

BLADES



Tractor balanced without blade

Note the slight difference in the point of balance due to location of attachment and weight distribution. Hydraulic cylinders and control mechanism are mounted back of center of gravity.

Tractor balanced with blade

TAL TRACTRACTOR DISTRIBUTOR

Equipment

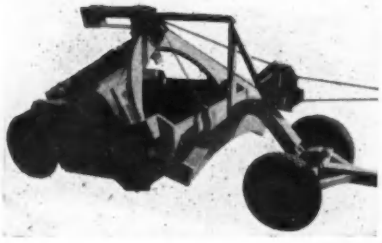
you ought to KNOW ABOUT

For further details about the equipment on this page please write to the manufacturer, mentioning Excavating Engineer.

Scraper

Manufacturer: R. G. LeTourneau, Inc., Peoria, Illinois.

Claims: The model D Carryall will replace former models X and Z to standardize and simplify the scraper line. The improved and newly designed small scraper has a struck capacity of 3.5 cubic yards. It incorporates the same features of design and construction that are standard on current

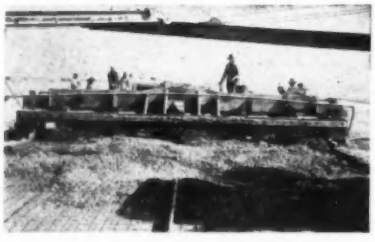


larger models. Major changes from the X and Z models include stronger and heavier box-type construction; overhead spring pipe; large carrying apron; elimination of throw-arm for raising and lowering blade and bowl. The new model is designed to operate with the D-4 or D-6 tractor.

Concrete spreader

Manufacturer: Blaw - Knox Company, Blawnox, Pennsylvania.

Claims: This new model transverse blade concrete spreader has width adjustments up to five feet

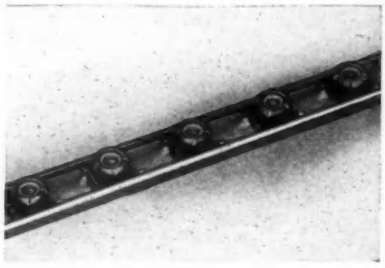


and by means of this adjustment a 10-foot spreader will extend to a maximum width of 15 feet, and a 20-foot machine to a maximum of 25 feet. The mechanical means for spreading moves concrete transversely and longitudinally at the same time, clearing a path for the forward progress of the machine. The vibratory attachment for the spreader is operated from the same engine and transmission that drives the spreader. The operator controls both spreading and vibration at the same time.

Gang channel nuts

Manufacturer: Elastic Stop Nut Corporation, 2332 Vauxhall Road, Union, New Jersey.

Claims: Widely applied in the aircraft industry, these nuts are now offered for testing on the many applications in general industry where a multiple, self-locking, bolted fastening is required. The strips are factory-assembled, and it is necessary only to rivet or otherwise fasten them to the structure where they are

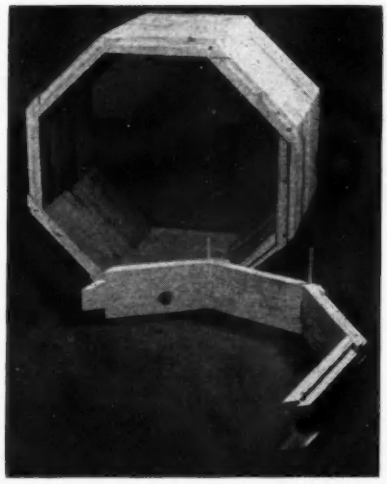


to be used. They consist of specially designed Elastic Stop nuts, with four lugs at the base and installed at specified intervals in a metal channel strip which is preformed to accommodate the nut lugs under longitudinal flanges.

Wood drainage pipe

Manufacturer: Armco Drainage Products Association, Middletown, Ohio.

Claims: As the result of the shortage of metal for ordinary uses, a wood structure for drainage has been developed. This new drainage unit is made 100 per cent of non-critical materials, requiring no steel bands, nails or metal reinforcing of any kind. Wood has the advantage of being reasonably plentiful in most parts of the country; it is light in weight and it is sufficiently durable for the duration. Unlike the ordinary box-type of structure which is quite rigid, the opening of the emergency pipe is made up of a series of short stout segments, given an octagonal or other polygonal shape, connected together in an ingenious way to utilize



the full strength of the material. The units are shop assembled or fabricated into lengths of 12 feet or more, which in turn are simply joined together in the field to make a single structure. Strength tests show that this emergency pipe possesses many of the structural characteristics of corrugated metal pipe. It has flexibility which enables it to build up side support and increases its load carrying capacity. The thickness of the wood can be varied with the nominal diameter of the pipe.

Circumference scale

Manufacturer: Interstate Sales Company, 1123 Broadway, New York, N. Y.

Claims: The Divisor gives instant reading of diameters and circumferences of any circle up to 72″ in diameter, in steps of ⅛″ or less. The unit is useful in getting ordinate spaces for template layouts. The chart is printed in 4 colors and the readings are in fractions. For convenience, a table of decimal equivalents is included. It measures 12″x12″ flat or 12″x4½″ when folded; will fit into pocket or tool-box.

Positive Control for ACCURATE SPOTTING

Independent Boom Control

On this big defense job Koehring Cranes were an important factor in the high speed building construction. Koehring Cranes swing or travel while raising or lowering the boom. This important advantage saves time when handling material, setting steel or forms, spotting concrete buckets. Booms may be lowered by power for safe and positive operation. Adjustable jib boom, power controlled, and collapsible gantry frame, power controlled, are other important time-savers. When high speed, safe operation is necessary, Koehring Cranes have advantages to help speed building construction.

KOEHRING COMPANY
MILWAUKEE • WISCONSIN

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

For your convenience in writing to Koehring Co., you will find a card bound in this issue.

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PASSED

For your convenience in writing to Standard Oil Company of California, you will find a card bound in this issue.

BY CENSOR

U. S. submarines use RPM DELO— a lubricating oil for Diesels unequaled in any other country in the world.

The enemy can take this down in his notebook. He can even sneak a camera shot of it. But it won't do him any good.

Because with all the blueprints and photographs in the world he can't copy the calm, hard-headed skill and heroism of the men in our Navy submarines. He can't duplicate the free spirit and unhampered initiative that invented the submarine—and is going to keep on inventing.

And we're proud to say, for our part, that with all the oil in Asia neither he nor anybody else has anything approaching RPM DELO. And this is another thing he cannot copy.

If, at crucial moments, his rings stick and parts freeze—and he has to put in for overhauls many times as often—it will give us great satisfaction to say: . . . *"So sorry!"*

U. S. Navy submarines use RPM DELO and we're here to say that Uncle Sam has first call—and will continue to have first call—on every precious drop he can use.

Standard Oil Company of California

ORDER RPM DELO FOR YOUR DIESELS

RPM DELO is marketed under the following names:

RPM DELO · Caltex RPM DELO · Kyso RPM DELO
Signal RPM DELO · Sohio RPM DELO
Imperial-RPM DELO
CONCENTRATE

Ask your Diesel engine manufacturer or distributor for the RPM DELO supplier in your vicinity.

LET'S GO! U.S.A. · KEEP 'EM FLYING!

RPM DELO
REG TRADE MARK
DIESEL ENGINE LUBRICATING OIL

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Shots from the FIRING LINE

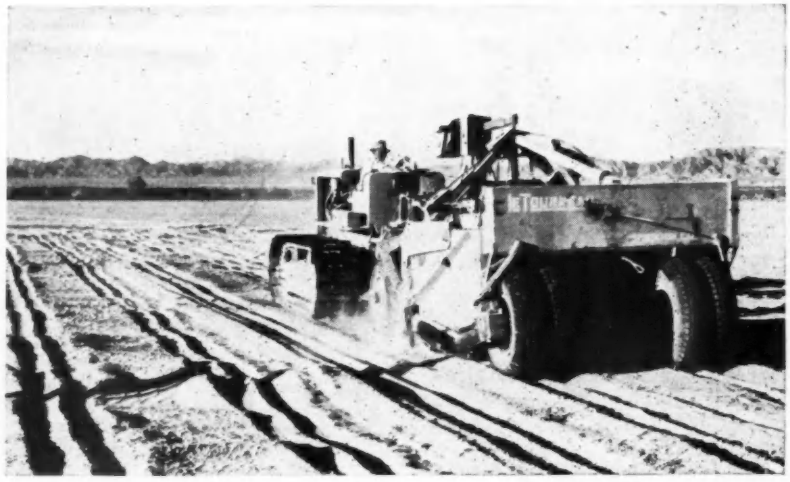
Colorado-Big Thompson Project

By F. N. Hollingsworth

Work is being pushed as rapidly as possible on the $55,000,000 Colorado-Big Thompson Power and Irrigation Project as being directly connected with war progress, although projects connected with irrigation only are being curtailed. The plan involves bringing water from the western to the eastern slopes of the Continental Divide through a horse-shoe shaped tunnel more than thirteen miles long, half of which has already been completed.

The 9½-foot bore may seem small, in considering the annual volume of water the tunnel will deliver, but the project is so planned that the flow will be constant throughout the year, instead of a seasonal ebb and flow. The primary object is to supply power, however, and it will furnish additional irrigation to systems already functioning, relieving an uncertainty of water supply that farmers have suffered for many years.

Included in the project is a huge dam on the North Fork of the Colorado River which will create an artifical lake lying below Grand Lake, from which the water will enter the tunnel. Giant electric pumps will raise water from the reservoir behind the dam to Grand Lake. These pumps will be powered with current generated by water fall from the eastern end of the tunnel to distant plains and valleys—water which the pumps themselves raised (about as near to perpetual motion as has yet been achieved). This electric power will be conveyed back over the Continental Divide to the western side by transmission lines. Once the water is started through the tunnel, the system will be self-sustaining and provide much power for other uses.



• L. E. Sinclair, California rancher, employs a LeTourneau scraper powered by a Caterpillar tractor to convert raw desert land into level, crop bearing land.

Farming With Grading Equipment

By Don H. Wimmer

Every year L. E. Sinclair, Calipatria, California rancher, looks out from the boundaries of his 3,350-acre Imperial Valley grain and pea crop lands and plans the breaking in of an additional 80 to 160 acres of raw desert land.

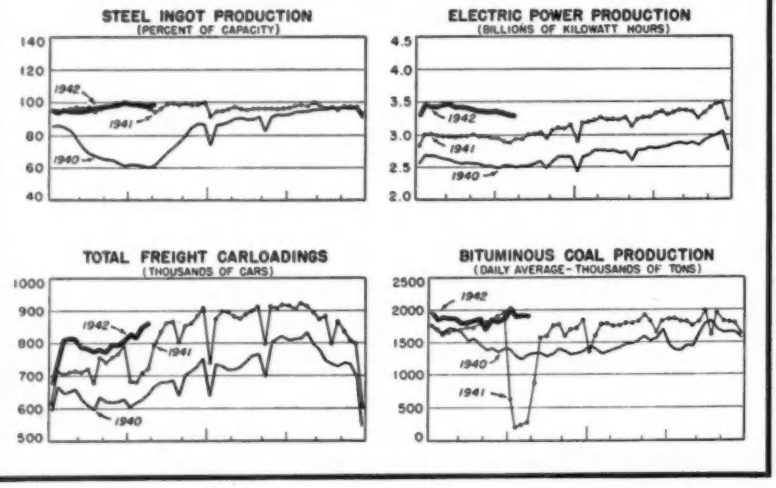
Great sand hills, acres of huge cactus plants, sage brush, rocks and desert sink holes have to be eliminated before this land is ready for its first cultivation and planting. This work must be done for the most part in stifling heat and terrific dust. During the early stages of the development of the Sinclair ranch this tedious and arduous work was done with mules and ordinary farm equipment.

Visualizing vast miles of open fields, Rancher Sinclair decided to depart from the orthodox farming methods of the pioneers to experiment with standard grading equipment normally used by contractors. As a result, each growing season he now finds it an easy job to reclaim additional acreage of heretofore worthless raw desert land with the same speed and low cost accomplished by contractors on road building and excavating projects.

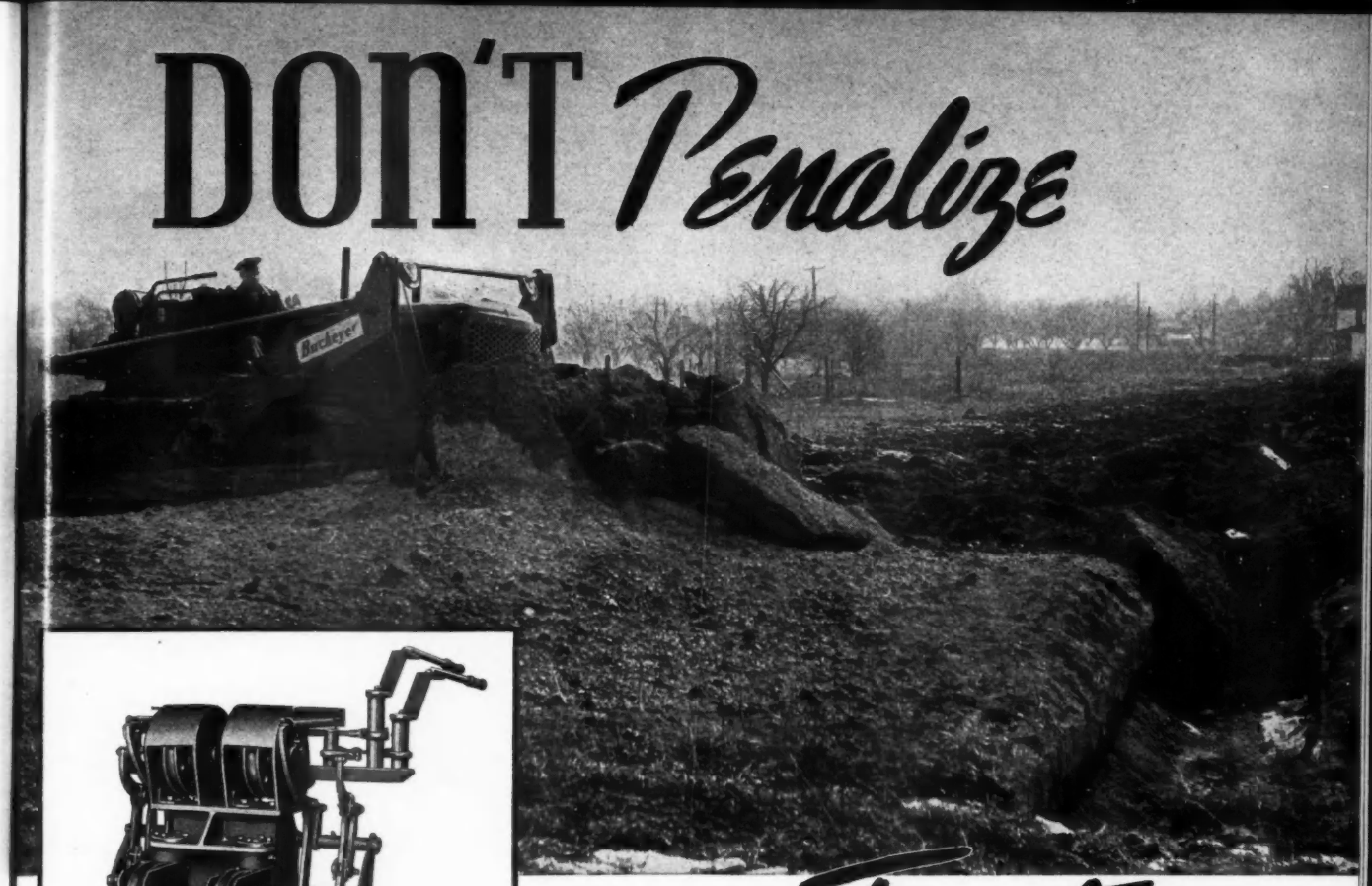
A 6-yard Le Tourneau scraper pulled by a 65-hp diesel Caterpillar tackles the sand hills and proceeds about the business of leveling off new farm fields in exactly the same manner as the road contractor grades a roadbed. This unit is followed by an 18-foot low-wheel grader, leaving a perfectly smooth expanse of sandy land ready for the tile laying machine, which now proceeds to lay about 12 miles of six and eight-inch tile at a depth of five feet at a cost of $6,000 for each 160 acre field. Operating costs for leveling average $40 an acre.

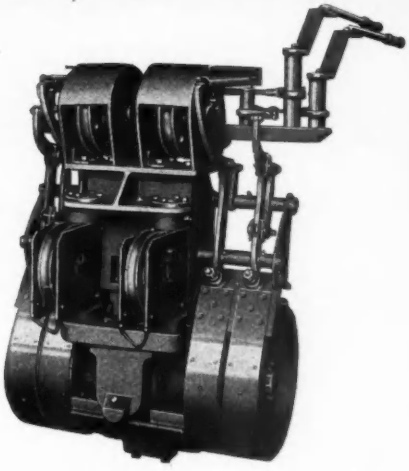
A three-foot breaking plow next enters the new field, pulled by two 65-hp diesel Caterpillars with 22-inch treads to provide better traction in the smooth, soft sand. The plow brings up a small percentage of clay to the top surface. This outfit breaks an average of three-quarters of an acre per hour at a tractor fuel cost of 20 cents per tractor per hour. Total cost of the 3-foot plowing operation averages $15 to $20 per acre, with an average of $20 per acre throughout the season. A four-bottom 18-inch plow is also used in this first ground-breaking operation, requiring a total of three 65-horsepower diesel

BUSINESS INDICATORS



DON'T *Penalize*





Model HD (Heavy Duty) Power Control Units —Single or double drum—for all larger model tractors.

•

Model MD (Medium Duty) Power Control Units—Single or double drum, recommended for all medium and small size tractors.

BUCKEYE TRACTION DITCHER COMPANY

Findlay, Ohio

your Tractors..

YOUR tractors are only as fast as the dozers you put on them. Sluggish dozer action puts a heavy penalty on your machines, robs you of the output they're built to deliver.

That's why so many contractors are turning to Buckeye cable control. Buckeye Power Control Units are lightning-fast—they'll keep pace with your tractors. Fingertip control gives instantaneous blade action with all the power you can use for lifting and crowding. All functions of dozer operation are coordinated smoothly and rapidly, whether on grading, backfilling, excavating or bulldozing.

It will pay you well to investigate the advantages of Buckeye Cable Control for operating Bulldozers, Trailbuilders, Scrapers, Rippers, and for a dozen and one other jobs.

Write to Buckeye today.

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Convertible Shovels

Trenchers

Tractor Equipment

R-B Finegraders

Road Wideners

Spreaders

Willard L. Hartley

News of the sudden death of Willard L. Hartley, Wisconsin shovel sales representative for Bucyrus-Erie Company, comes as a distinct shock to his many friends in the industry.

Stricken by a heart attack at his home in Wauwatosa on May 15, Mr. Hartley died immediately. He was 39 years old.

A friendly smile backed by a genial nature was "Bill" Hartley's calling card, and it was a welcome one throughout the sales territory he had been serving for five years.

Born in Duluth, Minnesota, Mr. Hartley attended the Duluth High School as well as the University of Minnesota. Mr. Hartley started to work for the Harnischfeger Corporation of Milwaukee in 1928. Nine years later, in 1937, Mr. Hartley left his position of district manager at that company's Memphis office and joined the Bucyrus-Erie Company's sales staff as their Wisconsin representative.

Mr. Hartley is survived by his widow, Mrs. Signe M. Hartley, two sons and a daughter, and two brothers, Earl and Clinton. Funeral services were under the auspices of the Wauwatosa Masonic lodge and interment was at Duluth.

Harry P. Davis

Harry P. Davis, 43, general superintendent of the Permanente Corporation's cement and magnesium plants in California, was killed in automobile accident on March 24.

An official statement by the company said Mr. Davis was apparently siezed by a heart attack, lost control of his automobile, and crashed into a tree on a highway near Los Altos.

Born in Virginia City, Nevada, Mr. Davis was a graduate of the University of Nevada. He had been with the Henry J. Kaiser organization for 15 years, and had been in charge of Permanente Corporation operations at the Monte Vista plant since that concern started three years ago. He was a key man in construction of the Grand Coulee and Bonneville Dams and in laying of foundations for the San Francisco-Oakland bay bridge.

Mr. Davis was widely known as the man, who perhaps more than any other, helped Henry J. Kaiser "change the face of the West." A Saturday Evening Post article on the Kaiser organization referred to Mr. Davis as "a genius with equipment."

Mr. Davis is survived by his widow, Mrs. Clarita Davis, and two children.

Caterpillars for the new land preparation projects.

When the leveling and breaking operations are completed, several hundred tons of barnyard manure are spread over the new ground and turned under with a ten-bottom 10-inch plow. The new fields are irrigated and a crop of sesbania (wild hemp) is planted. This hemp is extremely prolific and in a short time grows to ten to twelve feet high. Gradually with the help of the manure and hemp, a top soil is formed over the raw sand and the ground is ready for the planting of other crops.

The cost of acquiring and preparing this raw desert land, a feat impossible without the aid of modern grading equipment is shown in the following table:

Raw Land, per acre	$20.00
Leveling, per acre	40.00
Tiling, per acre	45.00
Deep plowing, first plowing of new land three feet deep	20.00
Barnyard manure, per acre	25.00
	$150.00

The time required for converting raw desert land into crop-producing fields averages one year on the Sinclair ranch, depending upon the speed with which the preparatory leveling work is done.

Sinclair has more than $20,000 invested in his land preparation equipment. When not in use on his own lands, he rents this equipment to neighboring ranchers.

WPB Equipment Restrictions

The War Production Board, acting to save substantial amounts of rubber, has assumed rigid control over the production and distribution of all types of rubber-tired construction equipment.

More than 70 items of construction equipment normally equipped with rubber tires are affected by limitation order L-82-a. Last year, the construction machinery industry used approximately 8,000 tons of rubber tires and tubes.

At the same time, WPB, in limitation order L-82, placed restrictions on the sale and production of power cranes and shovels, which are greatly in demand for military and essential civilian activities. Total requirements this year for these cranes and shovels by military and essential civilian users are estimated to exceed 7,500, whereas the industry's production capacity is only about 5,100 units.

In its order applying to rubber-tired construction equipment, WPB prohibits the future sale, lease, trade, loan, delivery, shipment or transfer of any new equipment without specific authorization of the director of industry operations, except for orders placed prior to the issuance of L-82-a which carry a reference rating higher than A-2, on which shipments must be made on or before June 1.

Between May 1 and June 1, no rubber-tired construction equipment production was permitted except to fill U. S. Army, Navy, Maritime Commission and lend-lease orders, to fill orders for specified items of equipment needed in the war program for which steel wheels or other substitutes for rubber tires are impractical, or on production schedules specifically approved by the director of industry operations. The specified items are: self-propelled earth moving graders, carrying and hauling scrapers, and power cranes and power shovels.

The order provides that after June 1, each manufacturer's production schedule, regardless of whether or not it is designed to fill war orders or orders for the specified items, must be approved by the director of industry operations. Proposed schedules must be submitted to WPB on form PD-446. This will provide a means of preventing any manufacturer from using critical material to produce equipment that would be useless without rubber tires and of preventing production for non-essential uses.

As defined in the order, construction equipment takes in many items, including snow plows, drilling machines, crushers, excavators, mixers, street sweepers, and others set forth in schedule A attached to the order.

The order places no restrictions on repossession of equipment in case of a breach of installment contract or other form of conditional sale. Equipment actually in transit to the ultimate consumer on May 27 was exempt from the terms of the orders.

L-82, covering power cranes and shovels, which can continue to be mounted on rubber tires, contains production and distribution restrictions similar to those set forth in L-82-a. Effective immediately, sales and other transactions are prohibited except upon specific authorization by the director of industry operations and to fill orders placed prior to the issuance of L-82 which carry ratings higher than A-2 and on which shipments must be made on or before June 1. Application for release may be made on form PD-448.

The order requires producers to file production schedules, and provides that cranes and shovels cannot be produced after June 1 except in accordance with approved schedules. The same reporting form may be used as provided for in L-82-a.

Power shovels and cranes are in demand for military use and also for such

"Job Planning"

A Service International Industrial Dealers Are Equipped to Render

International TD-18 Diesel TracTracTor, with 11-yard heaped capacity wagon, at work in an open-pit asbestos mine.

CONSTRUCTION activity today calls for careful, thorough *job planning*. On the power end of job planning, International Industrial Power dealers are "on the alert" with full cooperation.

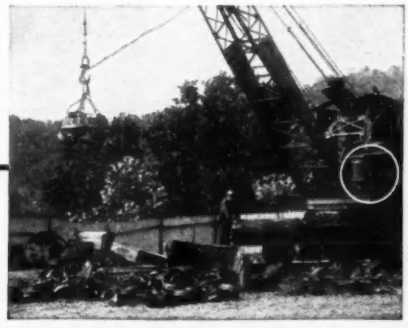
Here is how the International dealer can help you: He can give you valuable advice on fitting sizes and types of tractors to specific jobs. He knows allied equipment and how to coordinate it most efficiently with International TracTracTors, Wheel Tractors, and Power Units. His close association with International Harvester research, engineering, and manufacturing enables him to give you sound, practical, money-saving ideas on the best equipment to use, the best way to cut operating costs, the best way to get jobs done. Add his knowledge and experience to your own.

International Tractors and Power Units are built for hard work and long life. International Dealer Service and Job Planning *keep them working*—efficiently. There is much to be done and precious little time to do it. Keep your equipment in first-class condition. Keep it working at maximum capacity . . . for VICTORY!

INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue, Chicago, Illinois

Ground around a new factory is graded and leveled with this International TD-9 TracTracTor, with bulldozer, owned by Vest-Bartell, Cincinnati, Ohio.

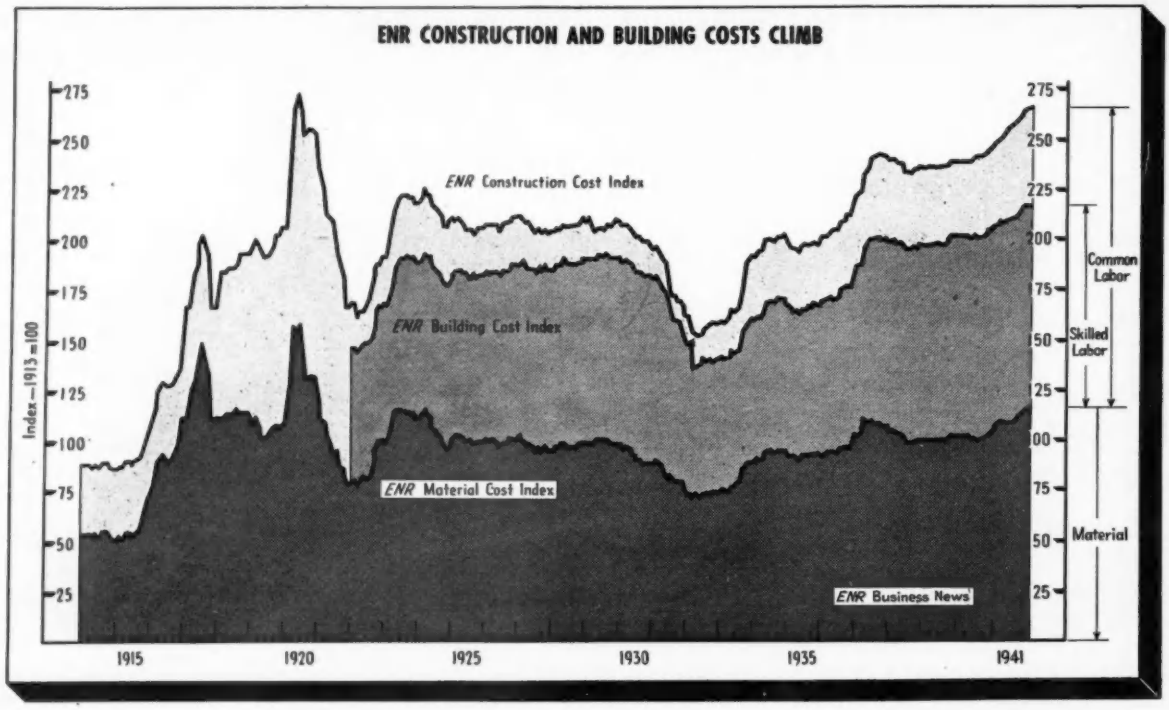
Contractor R. E. Campbell, Compton, California, uses this International ID-6 Diesel, with loader, on a Los Angeles project.



GET IN THE SCRAP!

Scrap iron and steel is on the march to the mills. Soon it will be *tanks* and *guns*, *ships* and *bombers!* Here an International U-2 Power Unit is speeding the salvage drive—generating power for control of the magnet—at Mansbach Metal Co., Ashland, Ky.

INTERNATIONAL Industrial Power



essential civilian uses as mining, war plant construction and industrial operations. WPB's Construction Machinery Branch, which will administer both orders, will exercise control over production schedules to make sure that each manufacturer produces machines best adapted to his particular facilities.

• This construction cost index chart, reprinted through the courtesy of Engineering News-Record, presents a comparative study of material, building, and construction cost figures since 1913.

Construction Cost Index

The Engineering News-Record construction cost index shown in the accompanying chart has four components: (1) structural steel shapes, base price; (2) cement at Chicago; (3) lumber, which until 1935 was 12 x 12 long leaf yellow pine wholesale at New York, and since 1935 is 2 x 4345 pine and fir in carload lots, 20-cities average; (4) common labor, 20-cities average of wage rates in force.

This construction cost index is designed to predict changes in construction cost trends and to measure the movement of construction costs in general. It is not intended to apply to any specific class of construction or to a particular locality.

In practice, the construction cost index has been used widely to apply to building costs and when common and skilled labor rates move in similar trends it is a satisfactory measure of relative building cost movement. However, following the low wage rates of 1932, common labor climbed much faster than skilled and reached new all-time highs by July, 1937. The increase was in the lower ranges between union and non-union. When "prevailing" wages became synonymous with union wages the gap closed, hence the 20-cities wage average increased more rapidly than the union rates.

To provide a more representative measure of building cost movement,

HAISS Hi-power
FOR PAY-LOAD CLAMSHELL DIGGING
ALL SIZES AVAILABLE
Your good crane deserves one! Real he-man digging power and a hefty sturdiness that will stand up to your toughest goings . . . a Haiss Hi-Power will make money for the man who owns it. Catalog on request.
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To Earthmovers with Idle Equipment

HOW YOU CAN HELP WIN THE WAR

Make Your Tractors, Scrapers, Dozers, Rooters and Construction Experience Available for Victory Projects — Consult Your LeTourneau-"Caterpillar" Dealer.

Perhaps you have too few units to get a war job on your own . . . or you're finishing a job and have some equipment which could be used elsewhere. America needs it!

The airports, offshore bases, training camps, ordnance plants, arsenals and war plants —needed so America can take the offensive THIS YEAR — require more construction work than all the equipment now on the job, working day and night, can complete in time. You owe it to your country and yourself to make your equipment, your management experience and your operators available for these Victory projects. Take stock NOW of your equipment and ability.

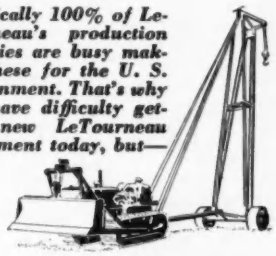
What to Do About It

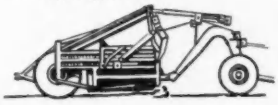
You can make your equipment available in several ways—by pooling your units and men with other earthmovers, so together you'll have enough to get a war contract . . . by outright sale for cash . . . by trade-in on machines to be delivered later . . . by renting or leasing.

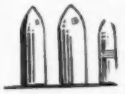
Talk to your LeTourneau-"Caterpillar" dealer, tell him what men and equipment you have—he knows the needs of the Victory projects in your territory or, if there are no nearby Victory projects, he can help you get information from other territories. If your tractors or equipment aren't in shape to work on war jobs, his shop facilities and expert, factory-trained servicemen can quickly recondition them.

Make your LeTourneau-"Caterpillar" distributor your Victory Construction Headquarters. Call him TODAY and any day you need service.

Practically 100% of LeTourneau's production facilities are busy making these for the U. S. Government. That's why you have difficulty getting new LeTourneau equipment today, but—







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Cash in early on this time and money-saving service . . . there's a LeTourneau-"Caterpillar" dealer near you. See him NOW!

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Manufacturers of DOZERS, CARRYALL* SCRAPERS, POWER CONTROL UNITS, ROOTERS*, SHEEP'S FOOT ROLLERS, TOURNAPULLS*, TOURNAROPE*, TOURNATRAILERS*, TOURNAWELD*, TRACTOR CRANES.
*Name Reg. U. S. Pat. Off.

Here LeTourneau equipment, pooled by two West Coast contractors, helps to construct a California Army camp.

For your convenience in writing to R. G. LeTourneau, Inc., you will find a card bound in this issue.

the skilled labor trend has been substituted for the common labor trend in the construction cost index, and the building cost index computed.

AGC Board Meeting

The spring meeting of the governing and advisory boards of the Associated General Contractors of America will be held June 8 and 9 at the Stevens Hotel in Chicago, according to President Dan W. Kimball. In announcing the meeting Mr. Kimball said:

"The task ahead for the construction industry can be told simply. The WPB stated recently that the war construction to be performed in 1942 will make the greatest construction volume of any year in history—$13,750,000,000.

"It will have to be done from now on without new power shovels and cranes, without new rubber tired equipment, without new trucks and tractors, with compressors and other machinery rationed, and with all types of new equipment scarce.

"It will have to be done with continually smaller quantities of critical materials, and with continual shortages of other basic materials.

"On the face of it, this task looks impossible. But the construction for war purposes must be done, and the construction industry must find the ways of doing it. There is no alternative. We are in a fight for existence.

"No one likes the restrictions we must work under, and the shortages of materials and equipment. But they are caused by the enormous quantities of weapons and munitions which fighting men must have to win the war.

"The industry has a heavy responsibility to perform its war work with all the speed, economy and efficiency demanded. At the same time the industry has a great opportunity for performing a vital service to the country."

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Because of its streamline design, a Sauerman Crescent scraper penetrates hard materials with the ease of a plowshare, and both in digging and hauling it requires much less line pull than any other scraper of equal capacity. It digs a heaping load in a few seconds, moves this load rapidly over the ground, dumps cleanly when it reaches the dumping point, and then returns at high speed to dig another load.

Write today for catalog and see for yourself how others are making big profits by using Sauerman scrapers for all kinds of material-handling jobs.

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War Speeds Road to Alaska

By Charles M. Upham

Events since the treacherous attack on Pearl Harbor have focussed world attention on our Pacific defense triangle of Alaska, Hawaii, Panama and California. Most exposed and least prepared point in this strategic group is the territory of Alaska. Because the Alaskan route from Tokio to California is 1,400 miles shorter than the better defended Hawaiian route and because Japan's great naval and air base at Paramushiru is only 750 miles from our Aleutian Island "bridge," the danger of direct attack is probably greater from that direction than from any other.

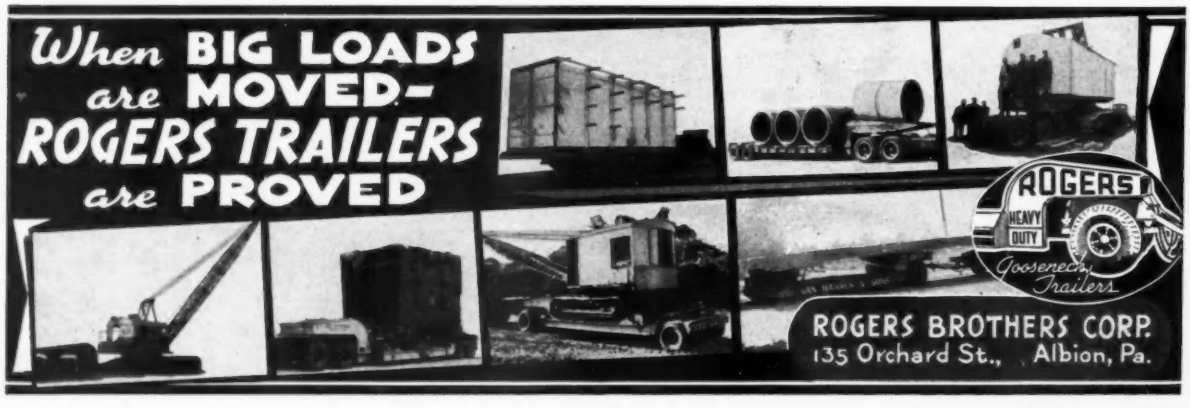
Alaska is closer to Asia than any other American point. The peninsula juts westward to within 54 miles of Siberia. Only eight miles of water lie between America's Little Diomede Island and Russia's Big Diomede. The Aleutian Islands stretch out to within 660 miles of Japan's naval base at Horomushiro. Over the North Pole, Alaska is closer to the continent of Europe than any other part of the United States and air flights across the top of the world are today feasible. For these reasons of location and bases, Alaska is the best route for an eventual American offensive against Japan. The neighboring chain of Soviet bases and air fields increases the offensive value of Alaska, in case Russia is later able to fight Japan, in addition to driving back Hitler.

In recognition of these vital facts, the United States is spending ten times the $7,200,000 purchase price paid for the territory in 1867 to strengthen Alaska. Air, submarine and naval bases are being built and enlarged by the Army and Navy. To supply these bases a land connection is now essential. Until the present time practically all traffic between the United States and Alaska has moved by sea. No road or railroad existed. The traffic by sea can be maintained only so long as we have sure control of the surface and underwaters of the Pacific. Danger that surface craft or aircraft or submarines operating off our coast may make it impossible to transport the needed supplies for the full equipment and expansion of our Alaskan military and naval expansion has hastened work on the long-planned highway to Alaska.

Long negotiations between the United States and Canadian governments were climaxed early in March with the announcement that the Canadian cabinet had approved the project,

Got An Idea for Victory?

That idea or invention you've always been planning to do something about might be mighty important to Uncle Sam's war production program right now! The National Inventor's Council is in search of inventions in any field that might be of value to the war effort. All material and inquiries should be mailed directly to the National Inventor's Council at Washington, D. C.



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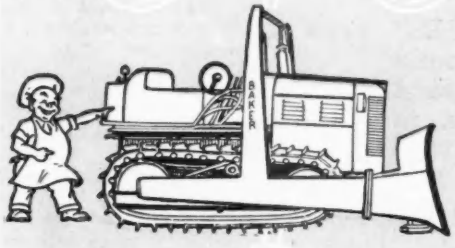

Weight is distributed over all the track rollers —no overhang—no "toeing out" of tracks. Tractors require less maintenance *too*, when equipped with Bakers!

Long before it was important to conserve materials and manpower thrifty Baker Hydraulic Bulldozer owners found out how simple they were to maintain—no sheaves, cables or brake bands to replace—they've been conserving vital materials and manpower for years! They have a lot less parts than any other tractor front-end earth moving equipment and fewer parts, of course, implies less maintenance and less lost time.

Baker Hydraulics are simple—nothing complicated about them—they're direct—that's the secret of their faster, easier handling. Direct lift and down pressure on the blade. Pick up a weight placed next to you—then try picking up the same weight at arm's length. Get the idea? This is an old sweet tune to many contractors—that's why you see so many Bakers on war projects.

The unit with a load and a half shown above is one of 21 Baker Hydraulics on an Army Ordnance Project. Bulletin 834 tells the other savings and advantages exclusive to these "landscape-changers".

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504 Stanford Ave., Springfield, Ill.

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The Modern Tractor Equipment Line for
EARTH MOVING
LEVELING AND GRADE BUILDING
SNOW REMOVAL
ROAD MAINTENANCE

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already recommended by the United States-Canadian Joint Defense Board. U. S. Army Engineer troops established at Dawson Creek, British Columbia, the first main base for survey and construction of a pioneer road over the nearly 1,500-mile route. That job completed, the Public Roads Administration will build a crushed-rock motor highway 24 feet wide over the same route. For defense or for offense, it will prove a powerful weapon in the hands of the United States.

Over this road will travel military trucks, bringing essential supplies of food, clothing, ammunition, gasoline and oil required by our enlarged forces. In emergencies, the military could be transported by land instead of by sea. Naval vessels and planes could be based advantageously to keep enemies away from continental shores and patrol large areas of the Pacific.

In addition to its outstanding military significance, the Alaskan highway will have great economic value in peacetime. The territory's great handicap has been the lack of transportation facilities, as there is only one railroad within its boundaries and highways are few. The defense highway will serve as a nucleus for an expanded road system through the territory, which will undoubtedly lead to future development of Alaska's latent mineral, agricultural and forest resources.

West Virginia Commission Turns to War Work

In what was described as the first move of its kind in the country, West Virginia State Road Commissioner Ernest L. Bailey announced April 18 the conversion of the state road commission's highway planning division into a war transport division.

Such highway planning work is carried on in each of the 48 states with federal-state financing, but West Virginia, according to Commissioner Bailey, was the first to shift its planning agency to war work.

The change of name and character of work performed by the West Virginia commission's research agency, effective for the duration of the war, was decided upon after a series of conferences with Public Roads Administration officials, who were said to have given their full approval.

W. R. Dunman, manager of the planning division, continues as head of the war agency. It was announced that the division's personnel and organizational setup would be changed only slightly, but that its functions would be carried out according to the demands of military authorities and federal war agencies for information on West Virginia highway transport problems and highway needs for the war.

The division, which was created early in 1936, already had made several important wartime studies, including a tire-condition survey which was said to have been the first of its kind in the country. It has furnished data on highway needs, aided in planning troop movements and prepared an estimate of critical materials needed in military highway work in the state. At the same time it had been continuing its basic work of traffic counts, road life, road inventory and fiscal studies, which hereafter will be conducted only insofar as wartime functions permit.

Emphasizing that the task of planning a postwar program would not be forgotten, Commissioner Bailey said: "Already, on the basis of facts gathered by this division, we have mapped out an extensive postwar highway construction program attuned to the state's needs of the future."

The construction division, he added, will have surveys and plans completed on the basis of this program, ready to start construction "when peace comes and the need for public works construction on a vast scale is again urgent."

New South Carolina Commissioner

C. M. Tripp is the new chairman of the South Carolina State Highway Commission, which organized for the year at a meeting April 23 in Columbia. He succeeds G. C. Chand, whose term, together with three other commissioners, expired April 15.

W. H. Anderson was named vice chairman of the commission. New mem-

HOW can time be saved? How can we make the best use of our raw materials now so urgently needed for so many purposes?

With Wire Rope the answer is in using the quality, construction and type that can be installed the quickest . . . that will deliver the most hours of work per pound of steel.

You can depend on Preformed "Hercules" (Red-Strand) Wire Rope for maximum efficiency. As it is easier to handle, it can be installed quicker. In addition to saving time, its longer service saves steel for other vital uses.

As Preformed "HERCULES" is furnished in both Round Strand and Flattened Strand constructions, there is, in this one grade, a right rope for every heavy duty purpose. You will like its smooth spooling . . . its stamina . . . its dependability.

In order to help all wire rope users obtain maximum service from their wire rope, we publish an illustrated booklet "Practical Information on the Use and Care of Wire Rope". We would be glad to send a complimentary copy to anyone interested.

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Save Time!

USE BUCYRUS-ERIE
Tool Wrenches

on your blast hole drilling tools.

CAST STEEL - HEAT TREATED

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USE IDEAL
RECHARGEABLE
Battery for Flashlights

1—PERMANENT
One IDEAL Rechargeable Battery can give up to 1000 hours of dependable light; you always have a "fresh" battery. Fits standard 2-Cell Size D cases.

2—RECHARGE
Instead of constantly buying new cells and throwing them away, you simply Recharge the IDEAL Storage Battery from any electrical outlet—or from an automobile battery — and it's just "like new" again!

3—GUARANTEED
Unconditionally guaranteed against defects in material and workmanship for a period of 6 months.

4—A BRIGHT LIGHT ALWAYS

Reduce Flashlight Battery Costs As Much as 75%

Where batteries are being used continuously, you can save up to $10 annually on a single IDEAL Battery. Multiply that by the number of flashlights you use to estimate your total saving. An IDEAL Storage Battery soon pays for itself—then pays dividends for a long time.

THOUSANDS NOW IN USE!

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★ BUILT TO LAST! Every working day for 17 years, a Wellman Bucket has unloaded crushed rock and sand for the Concho Sand and Gravel Co., Oklahoma City. In all that time (17 years) not one cent was spent for repairs or maintenance.

★★ FAST? "Our Williams digs and fills in rock and shale better than any other bucket ever used."—*F. F. Mengel Co.* "We have never seen a bucket dig like our Williams does." —*Central Contracting Co.*

Williams users report many benefits like the above experiences. They confirm the facts that Williams Buckets are unusually rugged and durable in service and fast in action. It shows too why your next bucket should be a Williams.

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Each type of Williams Bucket is covered by individual bulletin. Write
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WILLIAMS *Buckets*
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bers of the commission are E. C. Lewis, G. M. Neeley, H. Klugh Purdy, Sr., and W. H. Daniel, Sr.

April Construction Volume

War construction contracts continued in large volume during the month of April, according to F. W. Dodge Corporation. The dollar total of building and engineering contracts awarded during this month in the 37 eastern states amounted to $498,742,000. This was a 23 per cent increase over April 1941. While the April total was 18 per cent under the March figure, the drop is not considered to signify a trend, since April was the period of drastic curtailment of civilian construction, and at the same time a period of planning for large war construction projects to be started hereafter.

The April figures brought the contract total for the first four months of this year up to $1,859,944,000, compared with $1,462,156,000 in the first four months of 1941, an increase of 27 per cent. Non-residential building contracts increased 37 per cent; residential building contracts increased 20 per cent; and public works and utilities contracts increased 22 per cent. Included in the residential classification were 140,394 family dwelling units in new residential buildings, at a total contract cost of $528,242,000. The number of units increased 29 per cent over the first four months of 1941, while the dollar volume increased 7 per cent; this reflects a decrease in average unit costs, due to the elimination of nearly all types of new housing outside the war housing classification.

In addition to the large construction volume in the 37 eastern states, there has been a proportionate amount in the 11 western states, and a considerable, though, unannounced volume of work at various overseas sites.

Let New Alaskan Contract

Bringing the total of contracts held to 79-million dollars, Siems-Drake-Puget Sound Company of Seattle last month received a 14-million dollar additional contract from the U. S. Navy Department for construction work at Kodiak, Sitka and Dutch Harbor in Alaska. This associated unit is comprised of Siems, Spokane Company of Spokane; Johnson, Drake & Piper, Minneapolis; and Puget Sound Bridge & Dredging Company, Seattle.

Consolidated Builders, Inc., of Seattle, one of the contractors for Grand Coulee dam, has been issued a work order for construction of the $4,000,000 east power house at the dam. The power house, second at the dam, will be built as fast as priorities for materials can be cleared.

Kentucky Expects 30% Road Revenue Decrease

Kentucky's road fund revenue may be expected to drop to about $13,629,725 for the fiscal year which started April 1, 1942, more than 30 per cent below income of the fiscal year just ended, according to an estimate submitted to the state highway department March 20 by the state revenue department.

The highway department's income, which is derived chiefly from the state gasoline tax, totaled $21,614,112 for the fiscal year ended March 31, 1941, and for the first 11 months of the last fiscal year reached a total of $21,554,239.

"Since gasoline taxes dominate the fund, emphasis is placed on the adverse effects created by the prospective decline in passenger car traffic," it was declared by Acting Revenue Commissioner Ward J. Oates in submitting to the highway department his estimate for the new fiscal year.

Predicting that motor vehicle registrations "are about due for a phenomenal cut," and might fall off from 400,000 to 250,000, Oates added:

"The net change of the road fund will be progressively downward for an indefinite period. Viewing the situation from the present vantage point, none of a number of indeterminate factors which may come into play in the next few months will have a favorable effect upon road revenues."

Paving Breakers

Three Thor models in 32, 59, and 84 pound weight classes for light and heavy duty. Rugged, alloy-steel, drop-forged construction. Rubber grip handles. Short travel tubular valve. Latch type retainers.

Rock Drills

There are thirteen different models of Thor Sinkers, Stopers and Drifters. Light, medium and heavy duty types. Wet and dry operation.

"THE AIR TOOLS WITH THE EXTRAS"

Light, powerful Thor Air Tools provide the *fastest way* of doing scores of construction jobs from driving a spike to sinking a hole through solid rock. They drill, cut, demolish, dig, saw, pump, grind in a fraction of the time taken by tedious hand methods or by tools ill suited for the job. For Thor tools are "The Air Tools with the *Extras!*" The *extra power* that boosts output . . . the *extra handling ease* that cuts fatigue . . . the *extra operating efficiency* that spells profits. Put them to work for you!

- Rock Drills
- Paving Breakers
- Clay Diggers
- Sump Pumps
- Saws
- Hammers
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600 W. Jackson Blvd., Chicago, Ill.

For your convenience in writing to Independent Pneumatic Tool Co., you will find a card bound in this issue.

WATCH THE CRANE PERFORMANCE

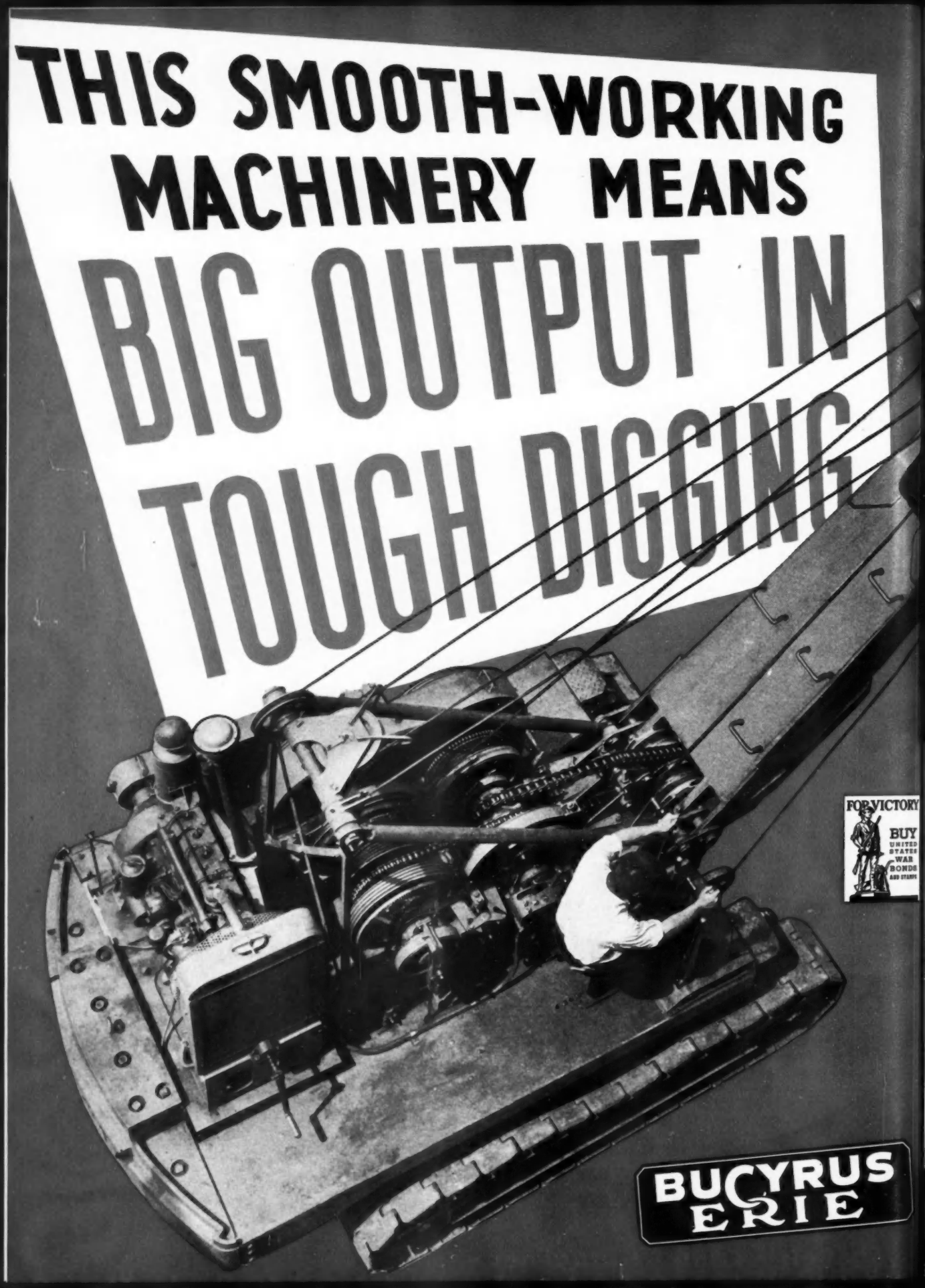
THAT NORTHWESTS ARE GIVING ON EMERGENCY JOBS TODAY AND YOU'LL BE CONVINCED THAT NORTHWEST IS THE MACHINE FOR SUCCESSFUL CONTRACTS TOMORROW!

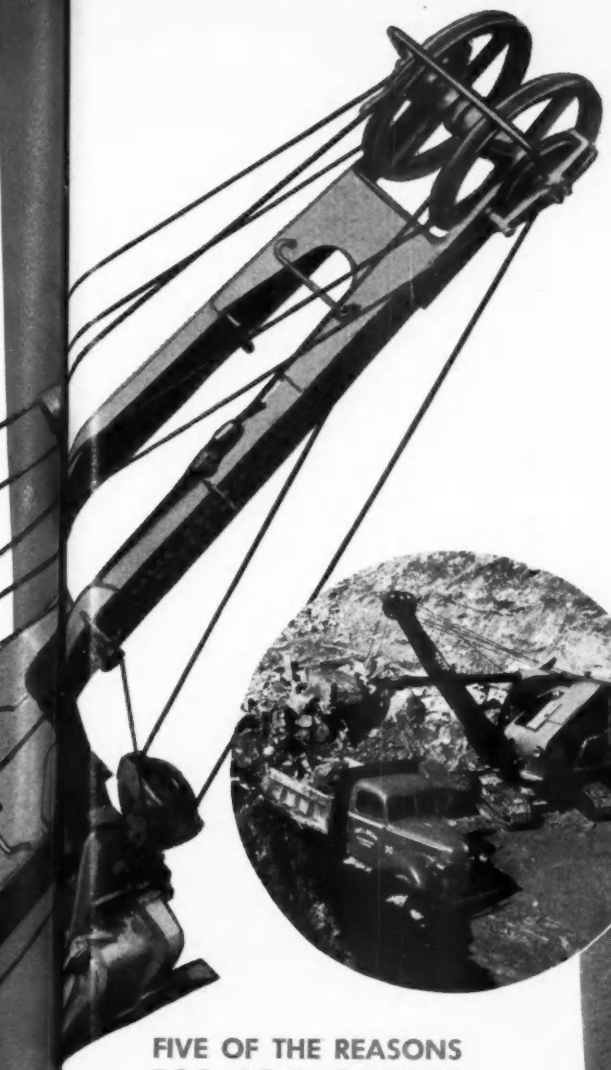
NORTHWEST ENGINEERING COMPANY
1750 Steger Bldg. • 28 E. Jackson Blvd. • Chicago, Illinois

NORTHWEST

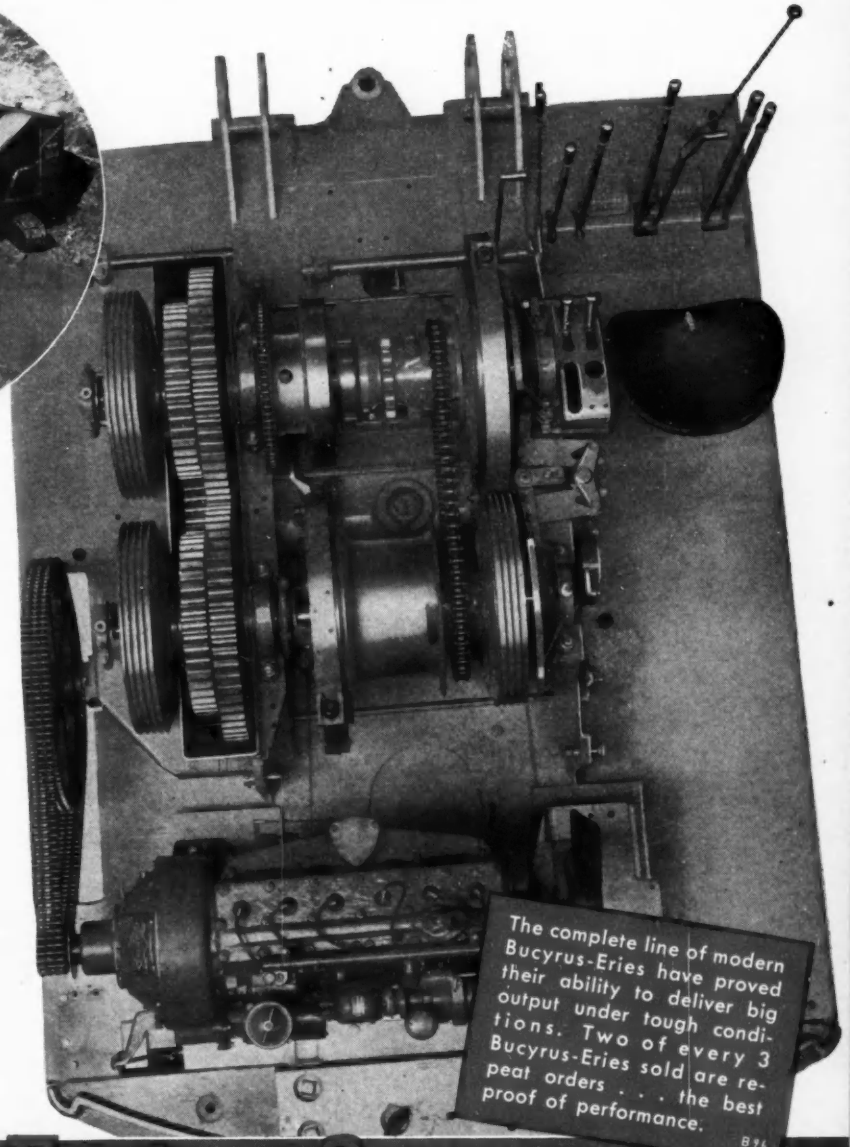
Shovels • Cranes • Draglines • Pullshovels

. . . If it's a real Rock Shovel you won't have to worry about output in dirt!


THIS SMOOTH-WORKING MACHINERY MEANS
BIG OUTPUT IN TOUGH DIGGING
FOR VICTORY
BUY
UNITED STATES WAR BONDS AND STAMPS
BUCYRUS ERIE



STUDY these pictures of the 15-B shovel and you'll see many of the reasons it is giving owners a new idea of ½-yard output. The essential simplicity of design means smooth performance, ability to deliver big output on the 3-shift basis demanded by wartime conditions. Simple design means, too, the ability to work long hours at high speed with minimum maintenance requirements.



FIVE OF THE REASONS FOR 15-B OUTPUT

1. Gasoline engine, 54 h.p. at 1325 r.p.m.
2. Cases enclosing transmission chain and gears in oil.
3. Duplicate 20 inch diameter clutches, self-adjusting for temperature variations.
4. Independent, positive twin-rope crowd.
5. All controls within easy reach for operator.

These are only some of the features that make the 15-B a big-output machine. If you have high-speed war work to do, find out the full story of 15-B performance.

The complete line of modern Bucyrus-Eries have proved their ability to deliver big output under tough conditions. Two of every 3 Bucyrus-Eries sold are repeat orders . . . the best proof of performance. B74

Bucyrus-Erie Company

SOUTH MILWAUKEE • WISCONSIN • U. S. A.

NOT in the Contract

A man driving through the country noticed a farmer with a bull hitched to the plow. Stopping his car, he said to the farmer: "You have a beautiful farm here and everything looks prosperous and I am wondering why you don't have a tractor to do your farm work."

"We have two tractors in the barn."

"Then why in the world have you got your cultivator hitched to a bull?"

"I'm just trying to teach this bull there is something in life besides romance."

A streetcar passenger was puffing away on a cigar and the conductor sarcastically drew his attention to the "No Smoking" sign.

"Oh, I saw it," said the passenger, "but I can't follow all your rules. For example, the card beside it says 'Wear Excelsior Corsets'."

Missionary: "Do your people know anything about religion, Chief?"

Cannibal Chief: "Well, we got a little taste of it when the last missionary was here."

Wife: "I was quite outspoken at the club today."

Hubby: "I can't believe it. Who outspoke you?"

Then there were two junior aviators who were learning to make parachute jumps. Each was told to count ten and then pull the ring, and that a truck would be waiting to take them back to the starting place. Both jumped, both counted ten, but the parachutes did not open. Nearing the earth pretty fast, one said to the other, "And in addition to this they probably won't have the truck there either."

"Watch me make that powder monkey jump!"

Change of Pace

A colored preacher, standing before his flock stared in dismay at the red blotch on his white starched bosom, made by an over-ripe tomato tossed by an unruly member of the congregation. He departed from his prepared sermon about the pearly gates.

"Brothers and sisters," he said softly, "there is gwine to be jes' about ten mo' minits of this hebben business. Then you is gwine to see all hell break loose!"

Explorer: "The jungle was all around us. Ammunition, food and whiskey had run out, and we were parched with thirst!"

Listener: "But wasn't there any water?"

Explorer: "Sure. But it was no time to be thinking of cleanliness."

The boat was sinking and the skipper rushed up to a bunch of scared passengers.

"Who among you can pray?" he asked.

"I can," answered the minister.

"Then you pray, mister," ordered the skipper, "and the rest of you put on life preservers. We're one short."

Auntie: "Well, Junior, how does it feel to be nine years old?"

Junior: "I'm in a tough spot, Auntie. I'm too old to cry and too young to swear."

A parson, walking down the street, was attracted by some very strong and colorful language close by. Turning, he observed a man having difficulty in slipping the rim of his spare tire on the wheel. "My good man, that kind of language won't help you," he said. "When you are in trouble you should ask the Lord to help you." "Well," replied the angry driver, "I've tried everything else, I might as well try that." So saying, he bowed his head for a moment, then raised up, took the rim and slid it smoothly and easily on the wheel. The parson looked, scratched his head, and said: "Well, I'll be damned!"

This is number 10 in a series of informative articles prepared by Macwhyte Wire Rope Company. The purpose of this series is to help wire rope users in these critical times to get the longest possible service from present ropes . . . through making useful facts on rope care more widely known.

CORROSION IN WIRE ROPE

Corrosion is one of wire rope's worst enemies. It strikes without warning. It often reaches an advanced stage before being noticed. And even though checked it still leaves its imprint of destruction.

We can better understand corrosion (and how to prevent it) by knowing what it is, what causes it, where and when it is likely to strike.

What Corrosion Is

The dictionary defines corrosion as "an action of eating or wearing away by slow degrees; a gradual decay by crumbling or surface disintegration; a gradual breaking down of the material attacked."

Two General Classes

There are two distinct types of corrosion:

Acid corrosion, and

Alkaline (or salt) corrosion.

In the case of acid corrosion the wires become pitted and stress concentrates at the reduced cross-sections where pits are located. This causes premature failure of the rope.

In the case of alkaline, or salt corrosion, the wires become encrusted with a layer of the products of corrosion. The rope becomes rust bound, for example. Alkaline corrosion increases the size and weight of the steel wires.

Acid and alkaline corrosion both may occur when ropes are operating in (or subjected to) ordinary atmosphere or weathering, or special conditions which subject the rope to either acid or alkaline substances.

What Happens When Corrosion Sets In?

When this occurs the rope loses its flexibility. Then some of the wires are overloaded, which causes them to break. This is the "beginning of the end" for the entire rope. It starts to wear away rapidly.

No Way To Determine Rope's Safety Once Corrosion Sets In

Corrosion, probably the most severe type of deterioration, is the most difficult to evaluate. Ordinarily when internal corrosion has taken place, external corrosion is also present. But it is impossible to accurately estimate by any known means the remaining strength or safety factor of the rope once corrosion has set in.

More Information

The next advertisement in this series prepared by the Macwhyte Wire Rope Company will discuss ways of preventing corrosion, or in those cases where corrosion has gotten a start how to check it from doing further damage.

Feel free to write us on this, or any problem you may have. We are ready at all times to do whatever we can to help you get the most from your wire rope.

* * *

VICTIMS OF CORROSION!

These ropes never had a chance to live a full and useful life. Left unprotected against the elements, they were attacked and needlessly destroyed by the ever present wire rope saboteur: corrosion.

A very good example of Alkaline Corrosion. Notice how outside wires are partially eaten away—a rope unfit and unsafe. Crown wires have broken up. The other side of the rope next to the sheave has few broken wires . . . but if flexed in the opposite direction they would also break.

This rope was exposed to acid fumes which caused the wires to become brittle. This reduced their fatigue resistance and resulted in the wires breaking while bending over sheaves.

Macwhyte Company Manufactures:
MACWHYTE PREformed and Internally Lubricated Wire Rope
Monarch WHYTE STRAND Wire Rope
MACWHYTE Special Traction Elevator Cable
MACWHYTE Braided Wire Rope Slings
MACWHYTE Aircraft Cables and Tie Rods

NO. 618-C

MACWHYTE WIRE ROPE
Made by MACWHYTE COMPANY, Kenosha, Wis.
NEW YORK • PITTSBURGH • CHICAGO • FT. WORTH
PORTLAND • SEATTLE • SAN FRANCISCO
DISTRIBUTORS THROUGHOUT THE U. S. A.

For your convenience in writing to Macwhyte Company, you will find a card bound in this issue.

• Suspended over the core fill area, this "big top" enabled Guy F. Atkinson Company to maintain a steady 24-hour schedule, regardless of rain or snow, during early fill placing operations.

Mud Mt. Dam

(Continued from page 293)

men, working with 22 hand hoists.

Six steel cables doubled across the canyon and fastened to concrete anchors tunneled into the canyon walls at elevation 1,120 supported the tent. Because of the variable width of the canyon, distances between anchorages varied from 450 to 570 feet. Suspended from each main cable were the pulleys and intermediate cables that kept the canvas taut. Eaves to take care of the tent and canyon wall run-off were placed at three levels (950, 1000 and 1050 feet) to accommodate the rising fill. However, it was only necessary to use the tent up to the second level as the remainder of the fill was placed during the dry season.

Producing Core Material

The Northwest 80-D shovel, equipped with a 2½-yard bucket, loaded the core material into five 8-yard trucks which hauled the material to a grizzly designed to remove 12-inch oversize rocks. Next, the material was screened by a trommel which removed all rocks from 5 to 12 inches in size. The balance of the material was directed into a bunker and loaded through three bin gates into 30-yard Magor and Western dump cars. Trains of five cars were pulled by an 80-ton Shay steam locomotive a distance of 1.7 miles, where the corefill material was dumped from a trestle on to a wet storage pile.

From this pile, core material was conveyed to a drying plant that removed all excess moisture above the laboratory determined "optimum" which ranged from 15 and 17 per cent. The drying plant consisted of three 72" x 28' oil fired, rotary aggregate dryers manufactured by the Madsen Iron Works of Los Angeles. After drying, the material was transported on conveyor belts to the canyon edge and lowered to the top of the core fill in 9-yard bottom dump buckets by two 30 ton stiffleg derricks. During the time the tent was employed to cover the fill area, these buckets were lowered through 20x30-foot "hatch ways" in the tent roof.

Core material dumped on the fill area by the 9-yard buckets was spread with bulldozers and then compacted by a minimum of six passes with a tractor-drawn sheepsfoot roller. In addition to this unit, a small tractor equipped with a pair of petrolithic tamper drums for the rear wheels was used close to the canyon walls where maneuverability was essential. A small strip immediately adjacent to the canyon walls was compacted by power driven hand tampers.

Experiments showed that after compaction, the water permeability rate of the core fill is about one foot per year.

During rock dumping operations on the up and down stream sides of the core, water jets were used continuously to sluice the fine materials into the voids in order to provide a rock-on-rock bearing and so reduce the eventual settlement. About 640,000 yards were excavated from the borrow pit, processed and placed in the core fill area of the dam in 200 working days. Approximately 14.6% of the material excavated in the borrow pit was removed in the screening process. The embankment volume was about 31% less than the ex-

• Pot holes and cavities found in Mud Mountain Dam bedrock during riverbed excavation operations were cleaned out and filled with compacted core material.

• One of Atkinson's two Bucyrus-Erie 29-T drills puts down nine-inch blast holes to depths of 90 feet at Mud Mountain Dam's No. 1 quarry.

cavated pit yardage after screening, drying and compaction operations. Fill placing work proceeded on a five day week basis with about 1600 yards of material turned out by the drying plant during each 7½-hour shift.

Two quarries were developed to supply the 1,900,000 yards of rock for the dam embankment; 4,000 yards for spillway riprap; and 50,000 yards used as haul road ballast. About 1,600,000 yards of this rock material was obtained from quarry No. 1 located 3.6 miles from the dam site. This quarry had a natural 60 to 100-foot vertical face of andesite porphyry rock with a 15-foot overburden of weathered agglomerate and general glacial deposit.

About 560,000 yards of this overburden was removed with bulldozers, draglines, shovels and trucks before quarrying operations could begin.

Blasting Operations

Two different methods of blasting were employed to break the rock. "Coyote hole" blasting, one of the methods, proved very efficient in certain parts of the quarry. This type of blasting is accomplished by driving a small tunnel into the quarry's face for a distance of about 108 feet with two or more 40-foot cross drifts. Powder is placed in tunnel and drifts at a ratio of about one pound per cubic yard of rock in place above.

In places where topography of the stripped rock did not permit efficient blasting by the "coyote hole" method, 9-inch churn drill holes were put down on 20-foot centers by two Bucyrus-Erie 29-T drills. These holes averaged 90 feet in depth and were loaded with approximately 1200 pounds of powder. The greatest number of holes blasted at one time was 137 and the yield of broken rock per pound of powder was comparable to that produced by the "coyote hole" method.

Rock from this quarry was loaded in 20-yard Western diesel dump trucks by the Bucyrus-Erie 120-B and the Northwest 80-D. All material was hauled to the dam site over a 32 foot wide rock-ballasted hauling road.

Quarry No. 2 provided approximately 360,000 yards of the required rock material and was located 2.4 miles from the dam site adjacent to the haul road from quarry No. 1. The geological formation of the second quarry can best be described as a diorite extrusion which has been partially covered with a deposit of glacial-borne sand and gravel.

With the exception of one "coyote hole" the blasting was done with holes drilled by wagon drills and jackhammers. A 1½-yard Lorain and the Northwest 80-D handled the loading at this quarry.

Approximately 205,000 yards of

• A 2½-yard Northwest excavates the riverbed preparatory to fill placing operations. About 264,000 yards of sand, gravel, and boulders were removed during these clean-up operations.

the rock taken out of quarry No. 2 was crushed to 3½-inch minus and used as transition zone fill in the dam and haul road surfacing.

After hauling to the dam, the rock was dumped in lifts approximately 40-feet high. The specifications require that every cubic yard of rock placed in zones 1 and 3 be sluiced with 1½ cubic yards of water with a nozzle pressure of at least 60 pounds per square inch. To provide the sluicing water, a pumping system was installed consisting of two deep well turbine type pumps and two horizontal centrifugal booster pumps with 8-inch diameter manifold pipes, 2½-inch fire hose and 4 portable monitors.

The quantity of rock placed in zones 1 and 3 of the embankment amounted to 1,700,000 yards. Approximately 191,000 yards of transition zone rock was also placed. The greater percentage of this material was excavated, hauled and placed at a rate of 11,000 yards per three shift (22½-hour) days.

Construction of Mud Mountain Dam is under the direct supervision of the Seattle District Office of the United States Engineer Department. Contract plans and specifications were made by the office of the Division Engineer, North Pacific Division, at Portland, Oregon. Successive resident engineers on the project for the government were Major J. D. Lang, F. E. Preble, Wm. E. Hoy, and A. H. Rodes.

Guy F. Atkinson Company officials are: Guy F. Atkinson, president; Geo. H. Atkinson, vice president. Company personnel at the dam included Ray H. Northcutt, resident manager; D. E. Root, chief engineer; J. J. Standish, general superintendent; and George W. Wintz, assistant manager; R. G. Rofelty, job engineer.

GATKE Moulded Brake Blocks and Frictions. Made to fit all Shovels, Hoists, Cranes, etc.

GATKE Clutch Facings. Made for ALL requirements.

DURA-BLOK Wire-Back Moulded Brake Lining

GATKE Heavy Duty Woven Brake Lining

Operators all over the country agree that *when you have GATKE Brake Lining and GATKE Clutch Facings, you have the best.*

GATKE Asbestos Friction Products have been perfected for every *brake and clutch* — LARGE or small.

Experience and knowledge acquired in 28 years of development to meet operators' service requirements go into their making.

Whatever your equipment or service, just tell us what you want. We *understand* service requirements and *we have what it takes* to meet them!

GATKE CORPORATION
232 N. La Salle St. Chicago, Ill.

Bomb Factory

(Continued from page 295)

Old buildings present in the plant area that were unsuitable for conversion into permanent quarters for plant workers, were sold by the government and salvaged by the buyers.

Old man weather did more than his share to cause trouble for the constructing contractors by providing several very wet rainy periods that transformed work areas into a sea of mud. However, the contractors are keeping a jump ahead of their operations schedule and as a result the ordnance plant will easily meet the government requirements for commencement of complete operations late this year.

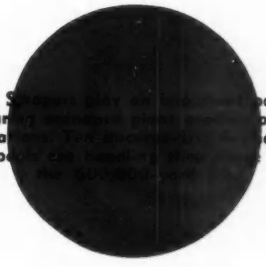
Working a maximum of 12,000 men all hours of the day in the midst of a large amount of moving power equipment, makes a good, working safety program of paramount importance and that's just the kind of a safety program that is being carried out by the operating corporation. As prime contractors for the ordnance plant, this organization is responsible for the safety of the men employed in the construction of the plant as well as when it is in operation.

For your convenience in writing to Gatke Corporation, you will find a card bound in this issue.

The operator's safety department is strictly a service organization to help the contractor speed up the job by keeping accidents to a minimum. All work area tool shacks are provided with safety equipment including goggles, face shields, respirators, hard hats, rubber gloves, skin cream, toe clips, and boot and goggle disinfectant. Cost clerks are furnished with first aid supplies for treatment and keep a careful record of all minor injuries.

A sign crew makes daily rounds installing road signs, slogans, and posters which range from small "30 miles per hour" size to 12x14-foot jumbo posters.

Weekly foremen meetings are held in each work area by the safety engineer. Foremen and superintendents are furnished regular statements of all lost time accidents, monthly summaries of statistics and periodic bulletins on specific hazards and approved practices. Seven area inspectors cover the project day and night on the alert for hazards, investigating accidents, and looking after first aid and safety supplies. Daily reports or recommendations are passed on to the contractor for action. As a result of these thorough precautions, lost time accidents have been kept to a minimum during construction.



Typical Ordnance Plant Equipment Line-up

Type	Number	Type	Number
Cranes, Draglines, Shovels	19	Road Sweeper	1
Buckets	16	Welder	1
Tractors	66	Tar Kettles	6
Bulldozers	35	Measure Hopper	1
Tractor Shovels	7	Pile Drivers	3
Graders	26	Concrete Mixers	2
Scrapers	22	Power Saws	10
Trucks	204	Table Saws	7
Trailers	2	Jackhammers	12
Trenchers	5	Mortar Mixers	3
Rooters	6	Concrete Paver	1
R. R. Crane	1	Boilers	6
Elevating Graders	2	Portable Water Tank	1
Crawler Wagons	6	Hoist	1
Compressors	8	Locomotive	1
Vibrators	51	Threading Machine	1
Tamping Rollers	13	Batcher	1
Motor Rollers	7	Motor Mixers	4
Light Plants	84	Lumber Conveyors	47
Grease Units	7	Post Hole Tractors	2
Portable Compressor	1	Drills	2
Fuel Tanks	14	Hydraulic Track Press	1
Pumps	29	TOTAL	745

Notes from the manufacturers

Cummins Diesel Engine Corporation of 1120 Leggett Avenue, New York City, announces the appointment of Charles D. Cavett as advertising and sales promotion manager. Mr. Cavett has been on the copy staff of Spencer W. Curtiss, Inc., Indianapolis industrial agency for the past three years and prior to that time was engaged in newspaper and publicity work in Ohio, California and New York.

Stewart-Warner Corporation recently held the annual meeting of stockholders presided over by Frank A. Ross, senior vice-president. Re-election of 6 of the 7 incumbent directors took place. Frank A. Hiter, vice-president and general sales manager of the corporation was elected as a director to replace T. C. Sullivan, retired. Re-elected directors are: Robert J. Dunham, Irving S. Florsheim, James S. Knowlson, Frank A. Ross, Ralph M. Shaw and Gardiner Symonds.

Cleveland Tractor Company, Cleveland, Ohio, has granted Wiley E. Brown, vice president and general sales manager indefinite leave of absence to join the United States Army. Mr. Brown has been called to active duty as a Major at the Ordnance Training Center, Aberdeen Proving Grounds, Aberdeen, Maryland.

The Asphalt Institute, New York, New York, at their annual meeting of board of directors, representing most of the major petroleum asphalt producers of the United States and Canada re-elected Herbert Spencer president of their organization. W. R. Macatee was continued as managing director. David Waxman of Shell Oil Company will continue as chairman of the executive committee. Other officers elected were J. A. Blood, Standard Oil Company of California; C. H. Dresser, Anderson-Prichard Oil Corporation; and H. B. Pullar, Berry Asphalt Company. George R. Christie, Standard Oil of New York was elected secretary and treasurer.

Caterpillar Tractor Co., Peoria, Illinois, announces the appointment of Gail E. Spain to the position of vice president and the promotion of John Q. McDonald to general sales manager. Mr. Spain joined Caterpillar Tractor Company in 1929. Mr. McDonald has been with the company since 1927. The company also announces the appointment of E. W. Jackson to the assistant to the president and the promotion of D. O. Nash to succeed Mr. Jackson as general service manager.

Broderick & Bascom Rope Co., St. Louis, Mo., has been awarded the Navy "E". The presentation was made April 30 by Captain E. Wolleson, U. S. N. (retired).

Worthington Pump and Machinery Corporation, Harrison, New Jersey, announces that the board of directors has elected Charles Neal Barney of Scarsdale, New York, a vice president of the corporation. Mr. Barney has been a member of the organization since 1918. The company also announces that Mr. Edwin J. Schwanhausser of Buffalo, New York has been elected to the Corporation's Board of Directors, filling a vacancy created by the death of Edward T. Fishwick.

The LaPlant-Choate Manufacturing Co., Inc., of Cedar Rapids, Iowa, announces the appointment of Mr. A. D. Dennis as secretary-treasurer. Mr. Dennis has been an Internal Revenue Agent for six and a half years and previously was with the Bank of America, San Francisco, Calif.

Timber Engineering Company, Inc., of Washington, D. C., announces the opening of a branch office in the Yeon Building in Portland, Oregon. According to the company, establishment has been occasioned by increased building of war projects which has brought a growing demand from engineers and architects for technical information.

WANTED
HELP — POSITIONS

Address all box numbers
c/o EXCAVATING ENGINEER
South Milwaukee, Wis.

HELP WANTED

MASTER MECHANIC for large quarry located in Michigan. Prefer man who understands Diesel Engines, Electric Shovels and Diesel Electric Generating equipment. Steady job, annual vacation with pay. Give full details, age, experience, salary expected and reference. Inquiries will be held confidential. Box 9192

SHOVEL OPERATORS for quarry familiar with Bucyrus-Erie 120-B Electric. Must understand repairs and electrical equipment. Steady year around employment, location Michigan. Give full details in applying. Box 9193

JOB WANTED

Railroad shovel and locomotive fireman and gas (dinkey) locomotive operator, 17 years experience, out of work because of closing railroad quarry for the duration. Age 60; two dependents. Best of health. Also familiar with all quarry equipment. Previous experience includes 18 years as switchman, yard master and conductor. Can handle any job to be done by a locomotive. Located in Iowa. Willing to go anywhere to a good job. Box 9194

POSITION WANTED

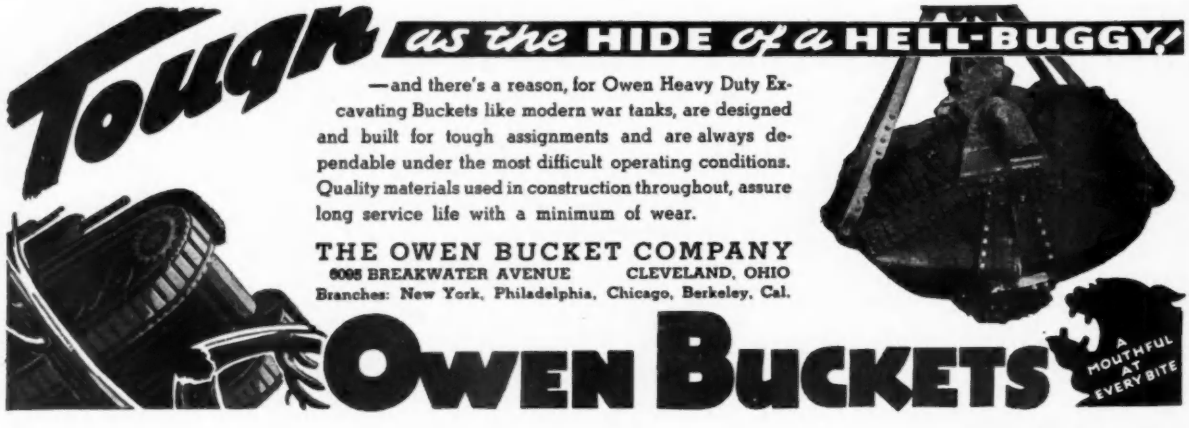
Power Shovel and Crane Operator. A-1 mechanic, fast operator on Bucyrus-Erie, Thew, Lima, or Byers, over 25 years on Excavating Equipment. Will go anywhere in U. S. or Mexico. Ohio birth certificate, age 46. Now in Ohio. Box 9191

New trade literature

Title: **"Blaster's Handbook"**

Subject: A complete, modern digest of present-day blasting methods. Written clearly and concisely by the technical staff of a large explosives manufacturing company. Bound in fabrikoid, the book is pocket size, yet contains 339 pages of practical information. The preferred practices covering the widest general applications are covered thoroughly.

Where to Get: E. I. du Pont de Nemours and Company, Inc., Wilmington, Delaware. Price $1.00.


Tough as the HIDE of a HELL-BUGGY!
—and there's a reason, for Owen Heavy Duty Excavating Buckets like modern war tanks, are designed and built for tough assignments and are always dependable under the most difficult operating conditions. Quality materials used in construction throughout, assure long service life with a minimum of wear.
THE OWEN BUCKET COMPANY
6095 BREAKWATER AVENUE CLEVELAND, OHIO
Branches: New York, Philadelphia, Chicago, Berkeley, Cal.
OWEN BUCKETS
A MOUTHFUL AT EVERY BITE

For your convenience in writing to The Owen Bucket Co., you will find a card bound in this issue.